THE HEATING AND VENTILATING MAGAZINE

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DETAILS OF CONNECTIONS

BY CHAUNCEY MATLOCK

A few days ago the editor of the HEATING AND VENTILATING MAGAZINE saw in my office a scrap book containing details of various methods of connecting coils, radiators, blower coils, feed water heaters and various other heating devices. At his request, I have undertaken to furnish from time to time such detailed drawings of these connections as may seem interesting and instructive to readers of the magazine.

Fig. 1 applies to a one-pipe installation, and shows a method of connecting two radiators from one outlet in a riser. In installing one-pipe systems with both the risers and radiator connections exposed, it is customary to take two radiators from each riser at each floor, and the usual method is to put a bull-head tee on the riser outlet and to connect a radiator to each outlet of the run of the tee. This method makes a very rigid connection, necessitating any expansion being taken up by the spring of the horizontal branches, and is particularly undesirable from the fact that it "butts" the returning condensation, causing sluggish circulation, and water hammer.

The method shown in Fig. 1 was designed to overcome these difficulties. It will be seen that the bull-head tee is eliminated, allowing sufficient flexibility to take up any up or down movement of the riser, and allowing the water of condensation to flow back to the riser by easy channels.

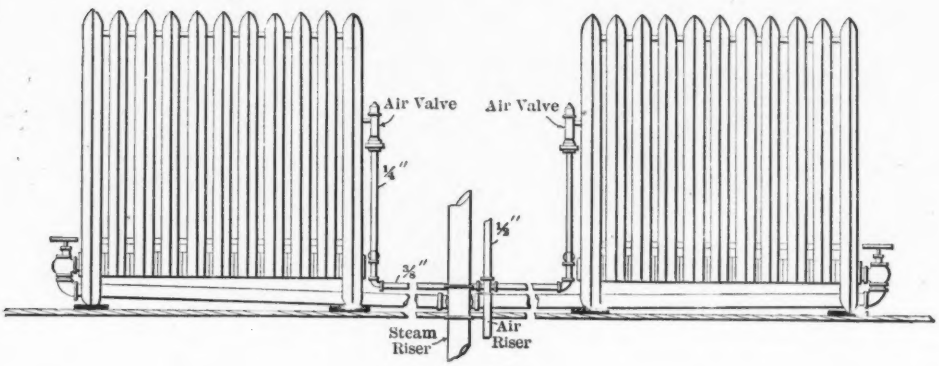
Fig. 1 also shows the correct method of arranging air piping. It is quite as important that the air lines be correctly installed as the steam lines, and for practically the same reasons.

Fig. 2 applies to a one-pipe installation, and is very similar to Fig. 1. except that the steam and air risers are run in a chase. The reasons given for arranging the steam and air piping as shown are substantially the same as given under Fig. 1.

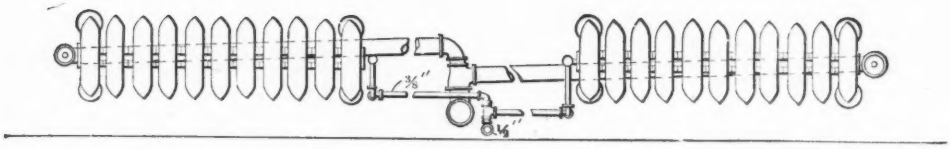
The combination of concealed risers and exposed radiator connections is very common, and steam fitters seem to find some difficulty in arranging a flexible connection, without "butted" returns, and at the same time preserving a neat external appearance. The method shown in Fig. 2 is exceptionally neat, and at the same time requires the removal of only one brick outside the chase.

Fig. 3 applies to a one-pipe installation, and shows a method of connecting one radiator to a riser. The riser outlet looks toward the front, and not toward the radiator, so that the radiator connection is necessarily made with three elbows, and three changes of direction, making an exceedingly flexible connection. The air line piping is arranged in the same manner as the steam. This method applies alike to concealed or exposed work.

The note on the drawing, stating that the horizontal branch should be one size larger than the radiator valve, is in line with the best modern practice in one-pipe work. It is done to prevent, as far as possible, the churning of the comparatively slow-moving water by the steam rapidly moving in the opposite direction.

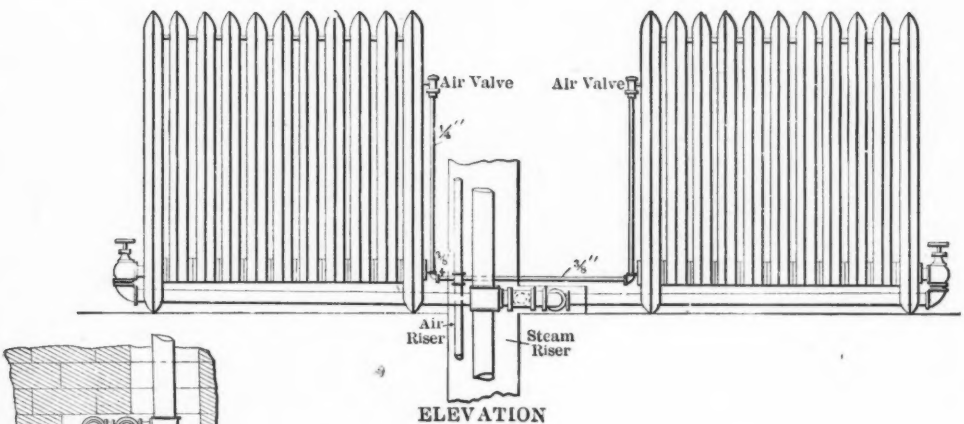


ELEVATION



PLAN

FIG. 1



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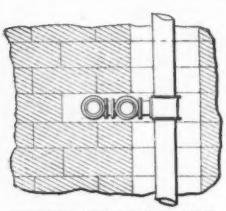
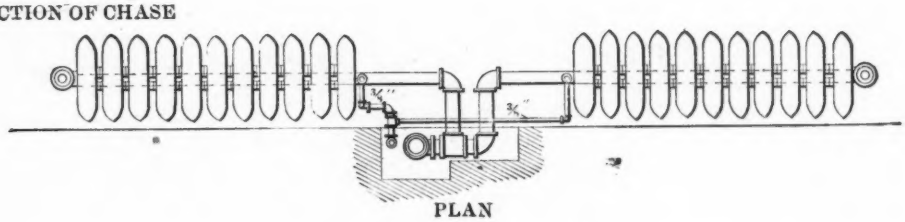


SECTION OF CHASE



PLAN

FIG. 2

DETAILS OF CONNECTIONS

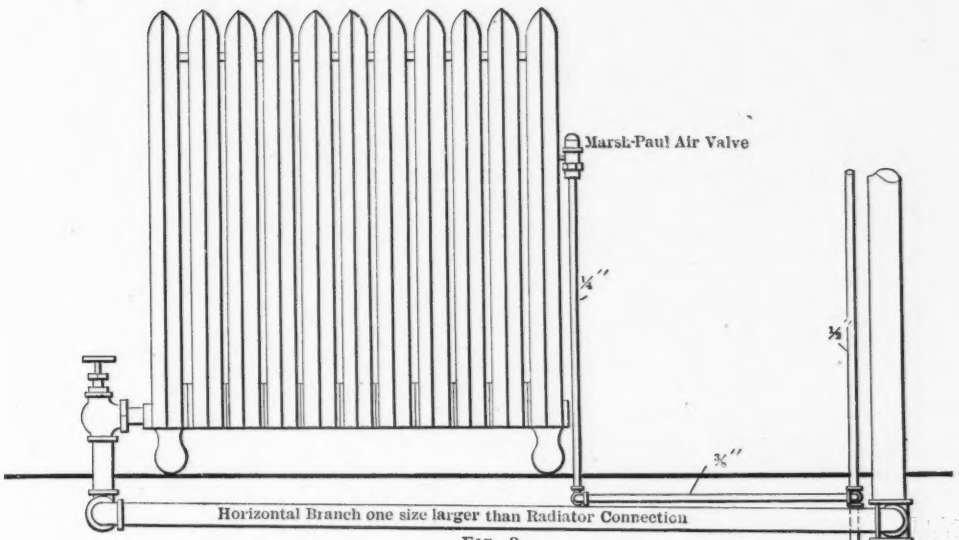


FIG. 3

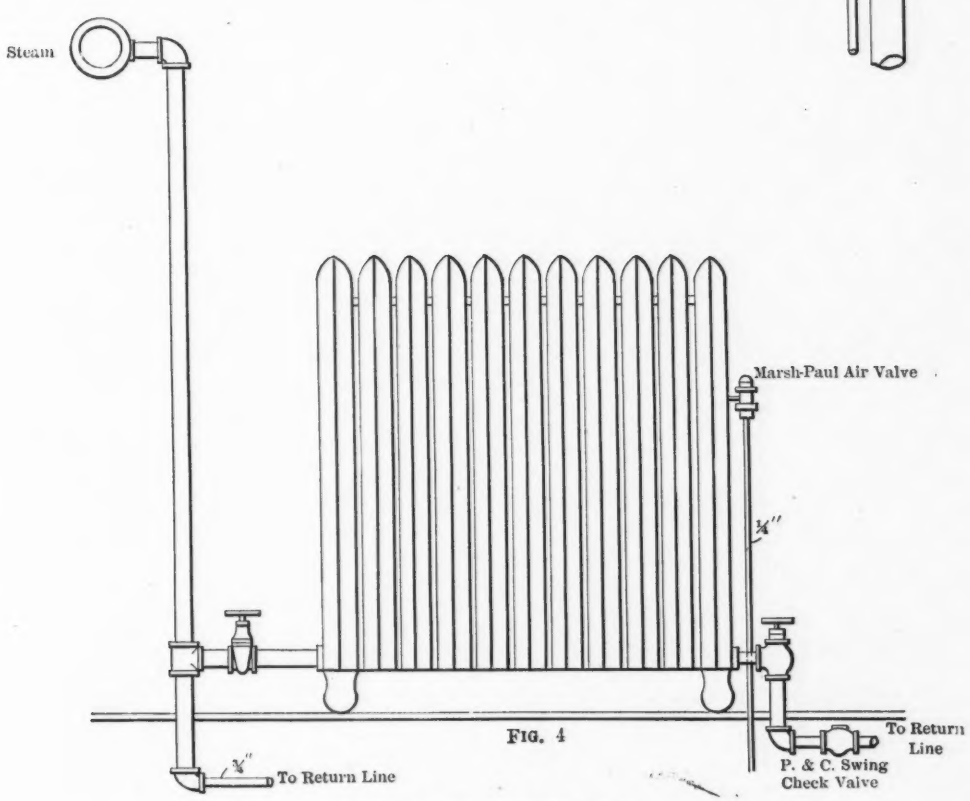


FIG. 4

DETAILS OF CONNECTIONS

Fig. 4 applies to a two-pipe installation, and shows a method of connecting a radiator from an overhead main, providing an independent drip at the heel of the vertical pipe. The steam valve is placed on the horizontal pipe, leaving the vertical free to drain at all times. The importance of this drip is frequently overlooked, and the valve is placed in the vertical pipe, making a pocket for condensation when the radiator is shut off.

Both a check and a hand valve are shown on the return. The purpose of the check valve is to prevent the inrush of steam from the return piping when the radiator is first turned on, resulting in the closing of the air valve before the radiator is hot. In ordinary cases the hand valve may be omitted.

CORRECTING A POOR HEATING JOB

By Arthur T. Richmond

I saw some time ago a low pressure steam heating plant in which one room was imperfectly heated. The room was about 18 feet square, 10½-foot ceiling, on the ground floor, facing the west, with two windows, each 4 by 7 feet. The radiating surface consisted of two radiators, each composed of thirty-two single vertical 1-inch tubes screwed into a cast-iron base, one radiator having separate steam and return connections and valves, while the steam for the other passed first through a coil of 1¼-inch pipe, five pipes high, 5 feet long. They were both supplied from the drip pipe at the end of a main supplying three stories above. The connection to each unit was ¾ by ¾ inch, the return being separate, with check valve below the water line. The aforesaid drip from the main was 1¼ inches down to the level of the steam supply to the coil, which was 1¼ inches, and continuing downward ¾ inch. This is shown in Fig. 1.

Naturally, the circulation here was very slow, these radiators being the last in the building to get hot, seldom being completely hot and often noisy, even though the condensation passing through the main drip is from only about 50 square feet of covered pipe surface.

The cubic contents, exposed wall, and glass surface of the room, are about as follows: Cubic feet, 3,402; exposed wall, 133 square feet; glass, 56 square feet; calling for radiating surface, on a liberal rating, of not over 70 to 75 square feet, which amount was already in place.

The remedy proposed by the engineer in charge was to remove the radiators and coil and substitute two new radiators of over 60 square feet each (an increase of about 50 square feet), altering the returns to suit the new conditions and making the steam supply 1¼ inches to each radiator, the connection for the farther one being taken 1½ inches from the main near the riser. Fig. 2 shows the new arrangement.

This certainly gives ample surface and steam supply for the room, and also a neater appearance, but a much less expensive method would be as follows: Retain the original radiators and coil, as they contain sufficient surface. Remove the original steam connections to the radiators, enlarge the inlet openings to 1¼ inches; make farther radiator tandem with coil, as before, but with enlarged supply; plug up the side outlet of 1¼ by ¾ by 1¼-inch tee on the main drip and take a 1½-inch supply from the top of the main, near the riser, as shown in Fig. 3. The returns in the basement should also be examined to make sure that there are no pockets above the water line.

With the first arrangement the reduction in area of the 1¼-inch drip pipe at the point A (Fig. 1) tended to check the velocity of the water of condensation from the main and riser, and much of it would follow the current of steam into the branch leading to the radiators, choking up the pipes that should carry only dry steam. While in this case this would amount to not more than five or ten

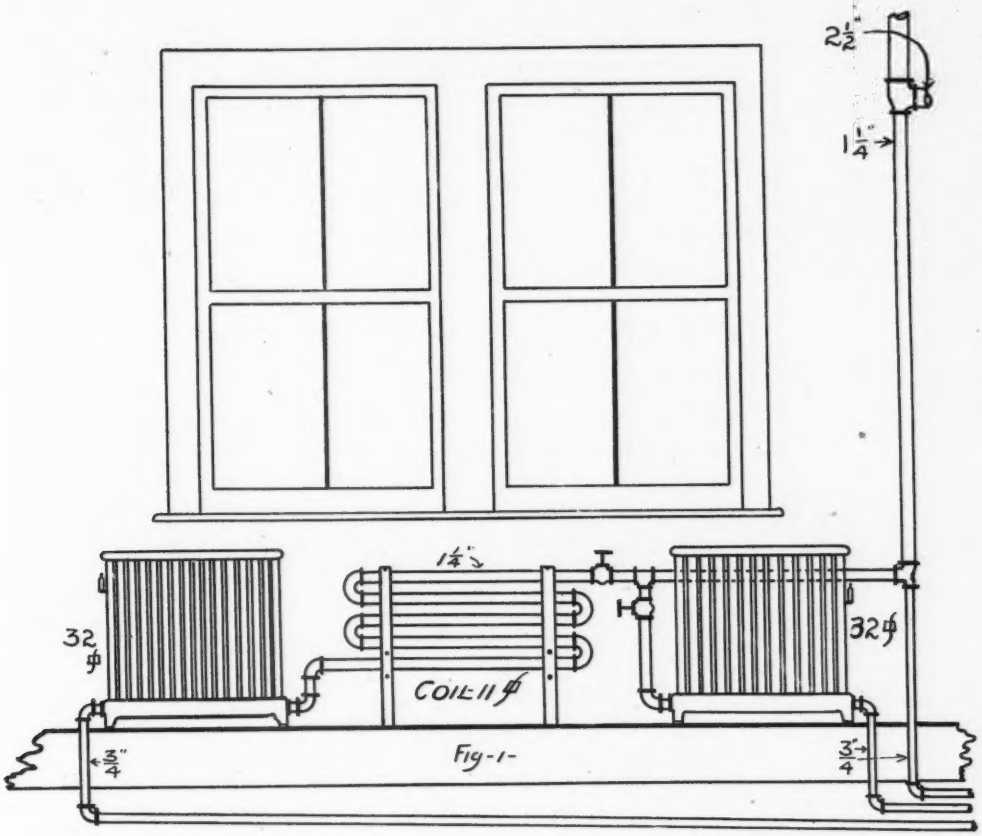


Fig-1-

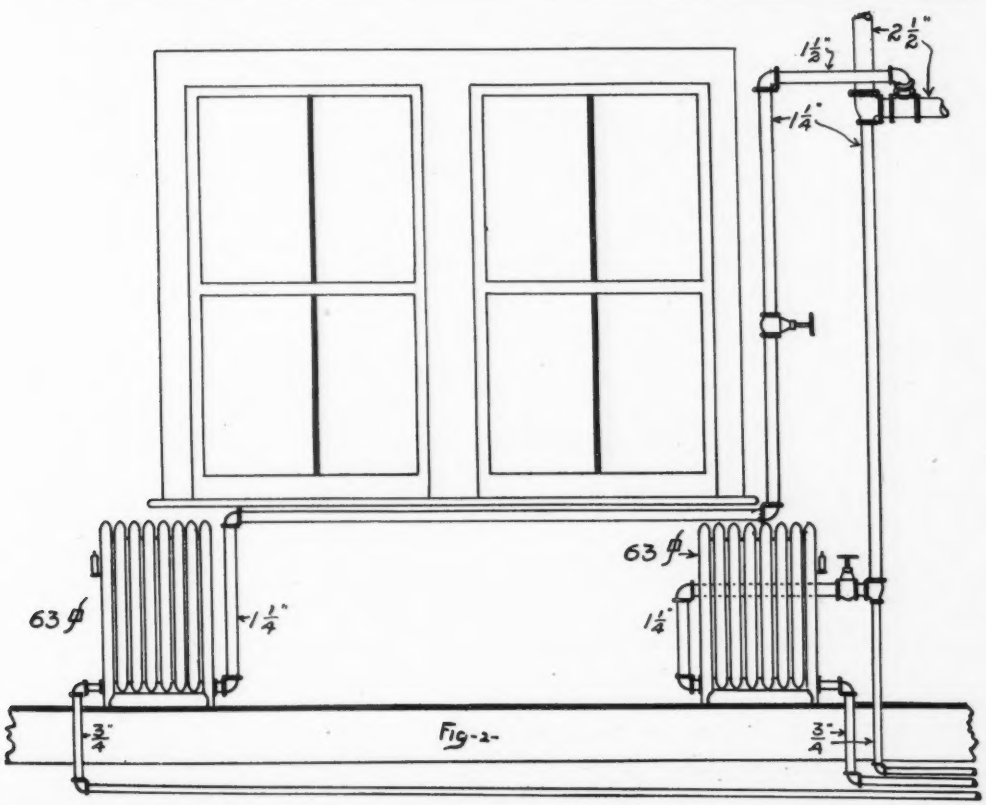


Fig-2-

pounds per hour, yet every little counts and a very slight obstacle may disturb the balance of a system.

In making changes here according to either Fig. 2 or Fig. 3, or on a new job, when taking a steam branch from a point near a main, it is better to put the tee in the horizontal pipe than in the vertical pipe. If the tee were in the vertical pipe the condensation of the riser above would tend to follow the current of steam into the branch, as explained above. This is the more objectionable in a one-pipe system, because of the greater amount of condensation passing through the steam pipe. The condensation of the upper line interferes with the operation of the lower radiator, and the condensation of the lower radiator more completely saturates the supply of steam for the risers. With the tee in the horizontal pipe, the lower radiator discharges its water directly into the drip pipe, and I have often seen a poor job made satisfactory by this very simple change.

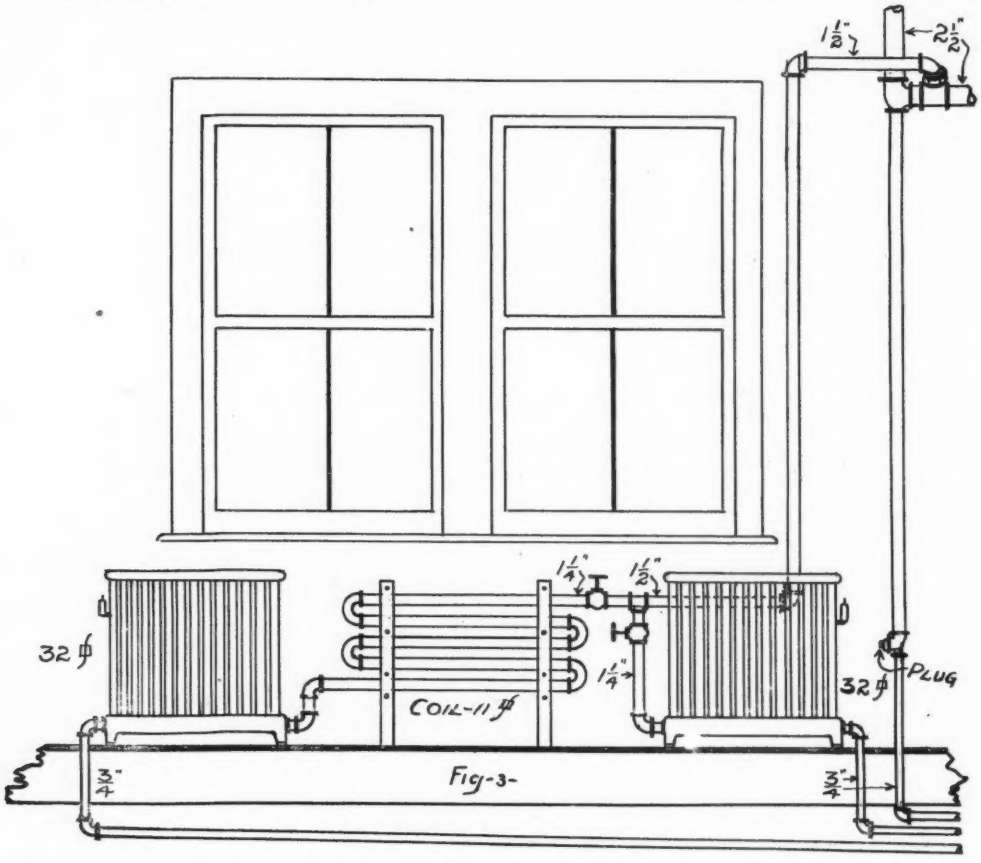


Fig-3-

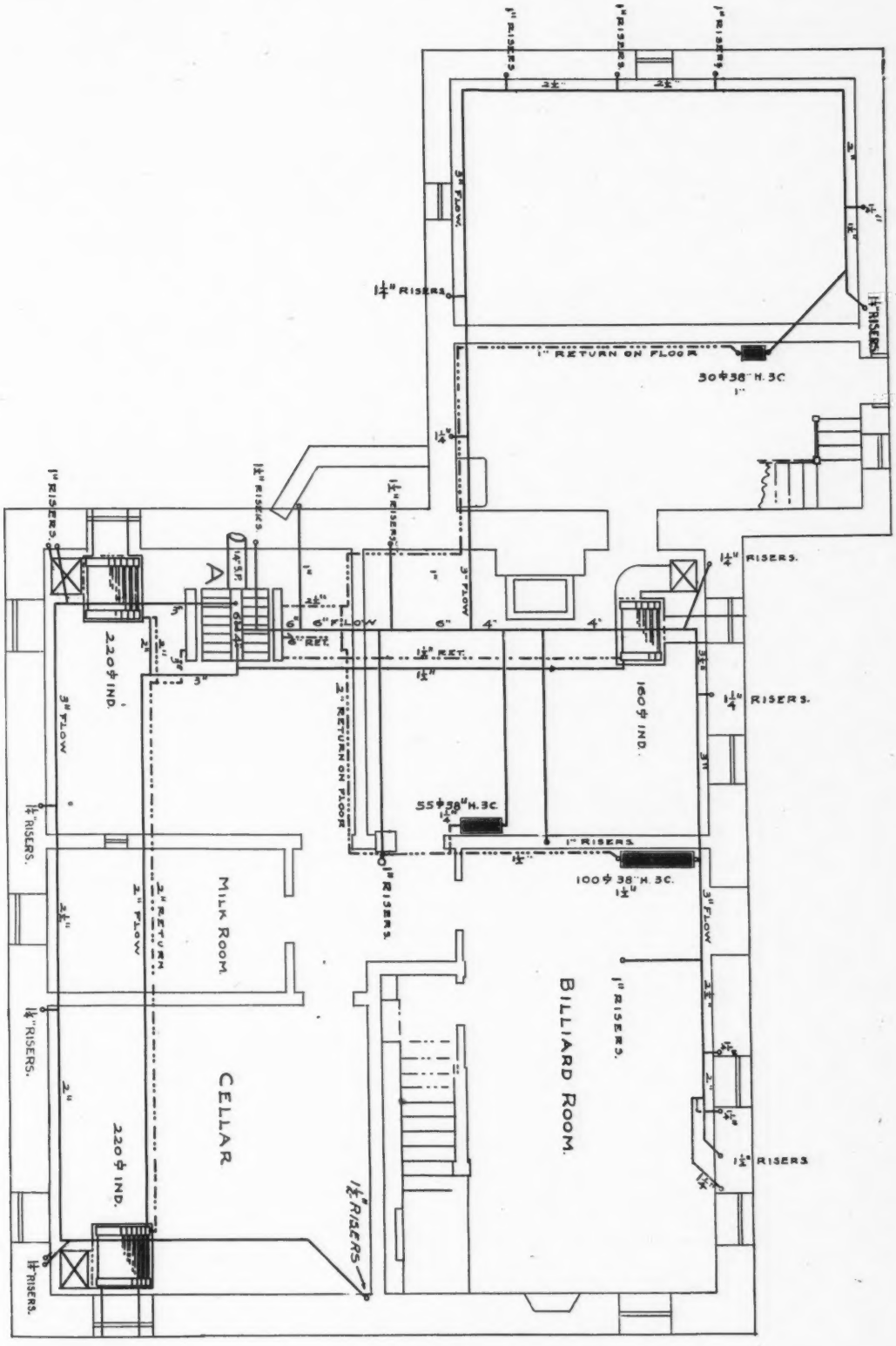
A TYPICAL HOT WATER HEATING JOB

The heating of buildings of moderate size by the hot water system has by years of experience and practice become so standardized as to be almost uniform.

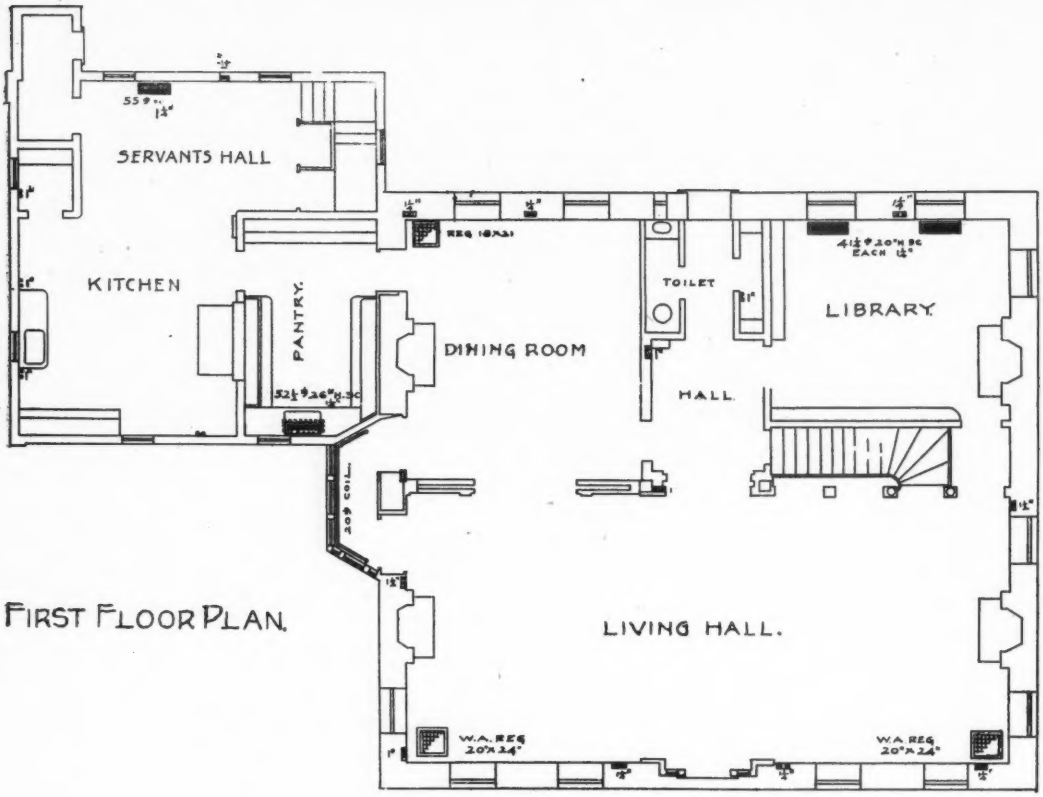
We are requested, however, by many of our subscribers to "remember the new beginner" and not devote ourselves exclusively to matter interesting only to the high grade engineer.

We therefore feel confident that the plans which we present herewith of a typical house heating job, done by the hot water direct and indirect system, will not be without interest to many of our subscribers.

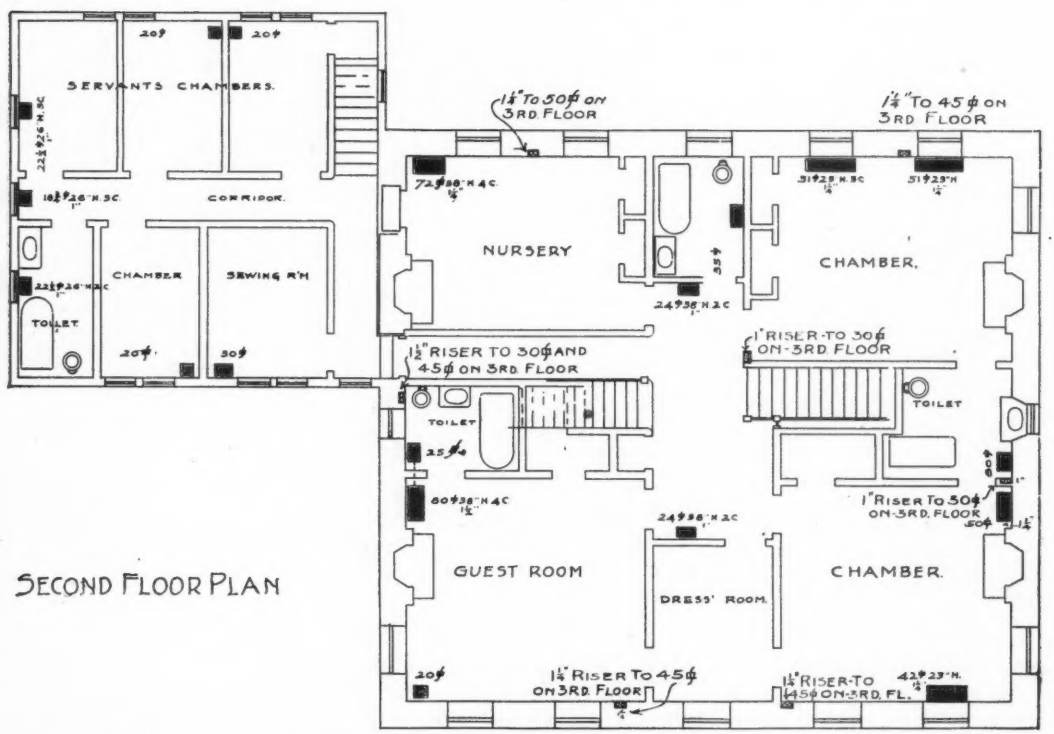
The building described is the resi-



A TYPICAL HOT WATER HEATING JOB



FIRST FLOOR PLAN.



SECOND FLOOR PLAN

A TYPICAL HOT WATER HEATING JOB

dence of Walton Ferguson, Jr., at Stamford, Conn.—a good suburban residence. There are in the building thirty-two direct radiators with an aggregate of 1,318 square feet of surface, and three School Pin radiators (H. B. Smith Mfg. Co.) two of 220 feet and one of 160 feet.

This radiation is supplied by a No. 168 Boynton Sectional Hot Water Heater (a Fig. 1.). The pipe lines are mostly shown on the cellar plan Fig. 1.

At the top of the boiler is a six-inch header, from which are taken three lines, the one nearest the front of the boiler being a four-inch main supplying the three indirect stacks. At the front of the boiler a 1½ inch flow pipe is taken off, leading back to the 160 foot indirect stack.

Then turning toward the front reduces to 3 inches, divided into two 2-inch branches, feeds the two 220 feet indirect stacks. All these indirect stacks are supplied with cold air brought in through three separate openings under windows close to the stacks and properly screened from dust. In each case the heat register is almost directly before the stack.

The direct radiation is supplied by a six-inch main running toward the rear of the building, supplying 185 feet of radiation in the cellar, 150 feet on the first floor, 368 feet on the second floor, 333 feet on the third floor, 200 feet on the attic floor, while a three-inch main running toward the front of the building supplies 166 feet on the second floor and 120 feet in the attic.

The return pipes run parallel to the flow pipes in all cases excepting those from the direct radiators in the cellar. These radiators are fed from the top by pipes dropping from overhead mains, and the returns under the floor are shown by dotted lines.

The proportioning of radiation to the rooms to be heated, having due consideration for the cubical contents, glass surface and exposed wall surface, is correctly figured, and the sizes of the main pipes and branches are in accordance with rules which experience has shown to give good results.

The work was laid out by A. B. Marshall, heating engineer, 209 Water street, New York, who furnishes the plans and information.

A NEW SYSTEM OF VACUUM RETURN LINE EXHAUST STEAM CIRCULATION*

By James A. Donnelly

In 1882, Napoleon W. Williames, of Philadelphia, patented in this country the art of circulating exhaust steam by the mechanical reduction of pressure upon the heating system. This being the foundation patent broad claims were allowed and every system of vacuum heating using mechanically induced circulation is founded more or less on this patent.

In 1891 a patent was issued to Willis E. Hall, of Altoona, which, broadly stated, in its subsequent use consisted in the application of a thermostatic valve to the Williames system, and it seems as if the clearest way to describe it, is to call it the Williames thermostatic system.

Based solely upon these two patents, with the addition from time to time of a few upon specific forms of thermostatic valves and special devices for better control of various features, a system of steam circulation was developed and sold in considerable quantity.

No further improvement of any consequence seems to have been made either by the owners of the patents or by others until the year 1899, and then a flood tide started that is even yet rising.

This serves as a very clear illustration of the discouraging effect that a broad patent invariably has upon invention. As will be seen from the dates it was not until after the Williames system patent with its broad

*Paper read before the Modern Science Club, Brooklyn, N. Y., Oct. 4, 1904.

claims ran out that a new lot of improvements started. It is also interesting to note that the possession of a broad patent tends to keep improvement down among its owners, for notwithstanding the large staff of agents and engineers connected with the company which developed the Williames and afterward the Williames thermostatic system the recent improved devices that they adopted were not developed by anyone connected with them.

Another factor that entered into the cause of the rapid filing of patents after 1899 was that though the Williames system prior to 1894 never was very popular, yet the addition of the thermostatic improvement and an efficient organization for its exploitation and sale, aided by the advertising it obtained from the attempted introduction of an air line vacuum system so boomed it that about the time of the expiration of the Williames patent it was getting to be quite a commercial success. That is, it was making money for its promoters.

From 1891 to 1900 apparently no attempt was made to use a mechanically operated valve or any other than a thermostatic valve upon a Williames system.

The owners of the patents as before stated seemingly were content in using their ingenuity solely upon an attempt to get a thermostatic valve of the highest possible efficiency—the reason for this probably being that the thermostatic principle was believed to be the only one which theoretically might be used in the production of a perfect trap, for all float or other mechanically operated valves necessarily must have a small opening left through them when closed in order that the air may be withdrawn when starting up the system. Thermostatic means was supposed to be the only possible way to afterward close this opening.

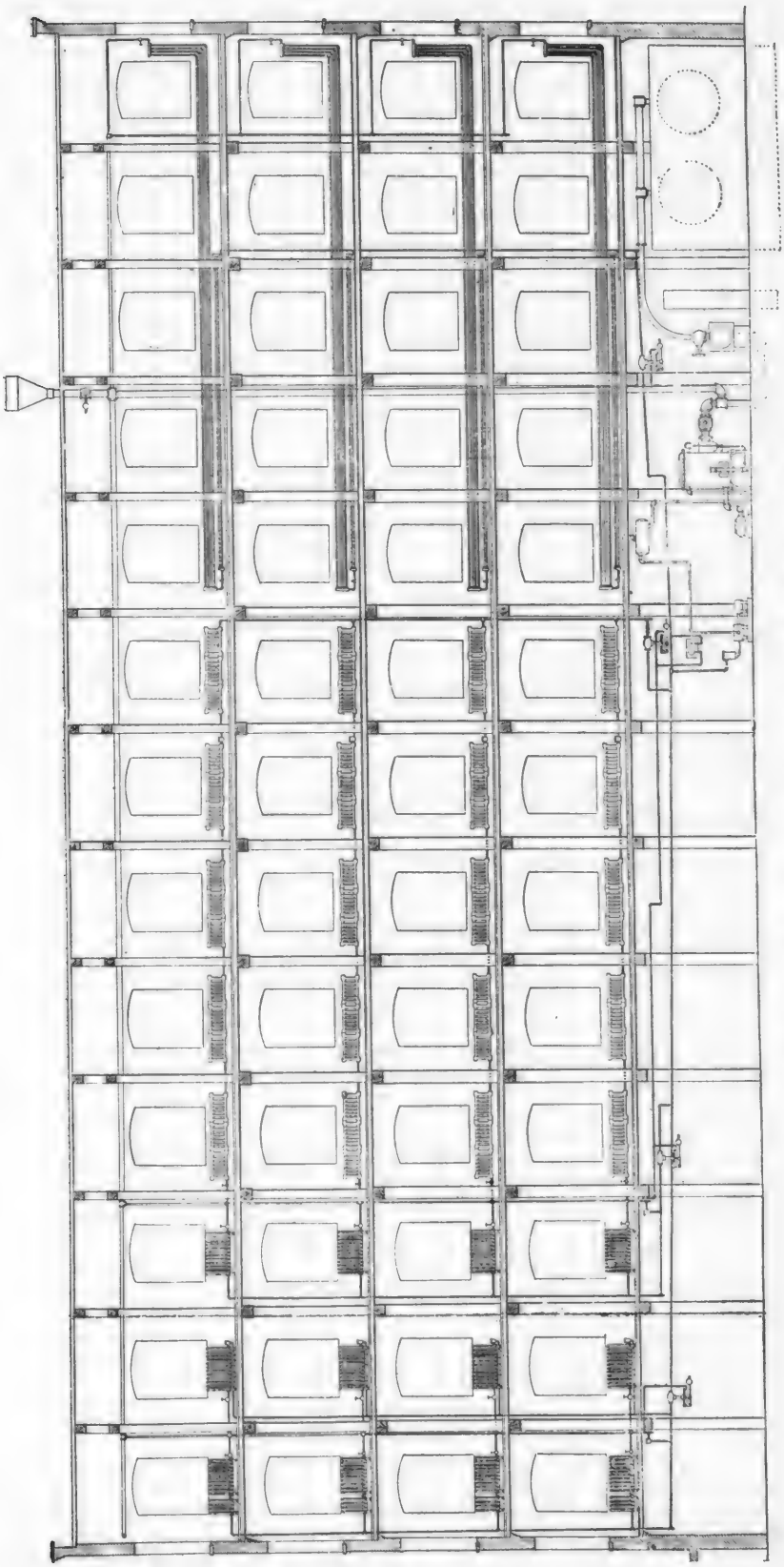
Here a statement made in the specification of the Hall patent is very interesting. "It is important that the valve should at intervals permit the escape of steam to the return pipe as well as water, the essence of the system being that the steam should be sucked into radiators, rather than forced into them by boiler pressure. Hence an ordinary float valve will not take the place of a thermostatic valve and my invention is confined to the use of a thermostatic valve in the combination described."

Of course it is very apparent that his view of the virtue of permitting steam at intervals to escape into the return was very incorrect and the owners of the patent used every means to keep all the steam out of the return. It is strange that they apparently did not see that his opinion as to the impossibility of using a float valve was incorrect also and take steps sooner to patent and protect some of the possibilities in this line.

In 1899, as before stated, patents began to flow into the office and the filing dates of patents issued for devices intended to be used upon the return of the Williames system are about as follows:

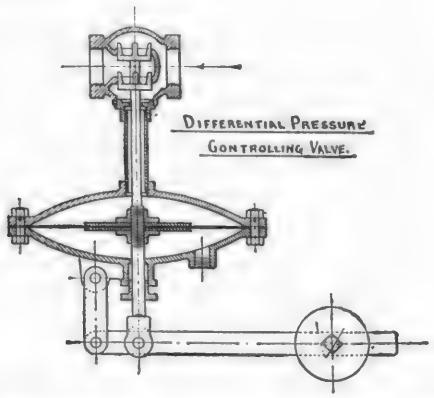
Ball	3-17-'99
Wade	10-16-'99
Davis	2-17-'00
Serrell	3- 9-'00
Crowder	3-12-'00
Atkins	3-23-'00
Davis	3-23-'00
Webster	5- 4-'00
Donnelly	5-14-'00
Donnelly	7-17-'00
Atkins	7-23-'00
Atkins	9- 8-'00
Serrell	11- 9-'00
Serrell & D	10-25-'00
Nistle	7-11-'01
Wade	1-13-'02
Atkins	3- 3-'02
Ball	3- 6-'02
Hamilton	3-15-'02
Piratt	3-19-'02
Hale	6-18-'03
Stewart	3-22-'04
Sharp	3-28-'04
Barnes	5-17-'04

Added to these there must be very many still in the office unissued.



A NEW SYSTEM OF VACUUM RETURN LINE CIRCULATION
FIG. 1—AN APPLICATION OF THE SYSTEM

A great many of these patents have been bought up, a few have been put upon the market and a still smaller number have had some measure of success.



A NEW SYSTEM OF VACUUM RETURN LINE CIRCULATION. FIG. 2—DIFFERENTIAL CONTROLLING VALVE

The most interesting fact of all is that the advertising and sale of the Williames thermostatic system has practically stopped and the Williames automatic return line system substituted.

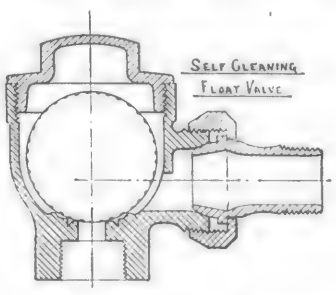
The demand and the market for systems using special methods of handling exhaust steam have increased so rapidly of late, that the question is now not "Shall some special system be used?" but "Which one shall be used?"

Considering the question upon its mechanical side it will be best to study what the present system can do.

The Williames automatic return line system is at present installed by two or three firms in the East and three or four in Chicago and the Middle West.

The best results that are produced by any or all of them are as follows: To convey steam from a source of supply approximating atmospheric pressure to and through the heating apparatus by a correctly designed system of steam piping so that the loss of pressure to the farthest point of use shall be a minimum; to place a control valve upon the inlet of each heating device so that it may be partially or wholly shut off; to place upon each drip from the steam main and upon the return from each radiator a self acting valve that is designed—first to have sufficient initial opening to draw the air off in a reasonable time—second, that it will either have sufficient opening when the water of condensation due to heating the radiator reaches it, as in a thermostatic valve, or increase the opening as an automatic or mechanically operated valve, so that the water is drawn away fast enough to offer no hindrance to the heating of the radiator—third, that when the radiating device is fully heated and the steam pressure has risen to its maximum, it will allow the water to pass into the return pipe, and a small quantity of steam supposed to be just sufficient to ensure the best results in the removal of the constantly accumulating air.

Having reached this state of supposed perfection in the art, though some rules have been published as to the number of automatic units which should be put upon each size piping, any further study as to what happens in the return line seems to have been abandoned, except that this point has been insisted upon by some, that the size of the return pipe instead of depending upon the amount of radiation upon the system and consequently having a constant ratio in size to the steam main, depended



A NEW SYSTEM OF VACUUM RETURN LINE CIRCULATION. FIG. 3—RETURN VALVE FOR CONTROLLED VACUUM SYSTEM

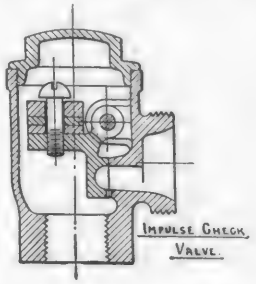
solely upon the number of thermostatic or automatic devices that were to be handled. It seems as if this argument should have sooner revealed the fact that if a return line

must be doubled in size for double the number of radiating units, the amount of radiating surface remaining constant, that it was not on account of the increased amount of air and water to be handled (for these would not increase) but on account of the double amount of steam that was expected to be drawn through the automatic valves.

Having used a steam and return line of approved design and sufficient size to convey the respective elements supposed to be handled by them, a vacuum pump, depending in size again not upon the size of the plant but upon the number of automatic units, must be placed upon the return main. In the suction of the vacuum pump it is also universal practice to place a combined dirt strainer and jet condenser head and the quantity of jet water that can be used without waste also affects the size of the vacuum pump.

The best results obtainable from the Williames system as installed ten to twelve years ago, was to heat 80 square feet of radiating surface with one horse power of exhaust steam. To-day no difficulty is experienced, using the Williames system with either thermostatic or automatic valves of good design, in heating 100 square feet. This loss of 20 per cent. was due to the wasted jet water in the old-time Williames system.

efficient back pressure and reducing valves, oil extractors, devices for separating the air and water of the delivery of the vacuum pumps, and automatically controlling them or auto-



A NEW SYSTEM OF VACUUM RETURN OF CIRCULATION. FIG. 4—IMPULSE CHECK UALVE

matically putting the water back to the boilers through feed-water heaters, purifiers and filters. These devices are common to all systems.

To take into consideration the other side of the question; the disadvantages in the best results that these systems have thus far produced are as follows:

Having conveyed the steam to the point of use and obtained a result with which no fault can be found, that is, the radiating surface has been supplied with steam as near the pressure and temperature of the source of supply as possible, a perfect valve is desired for the return of the radiating device. This valve should have

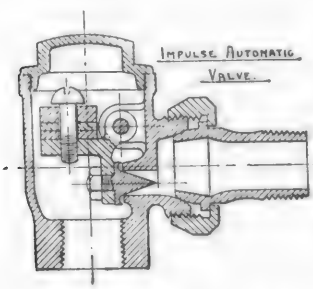


FIG. 5—IMPULSE AUTOMATIC VALVE

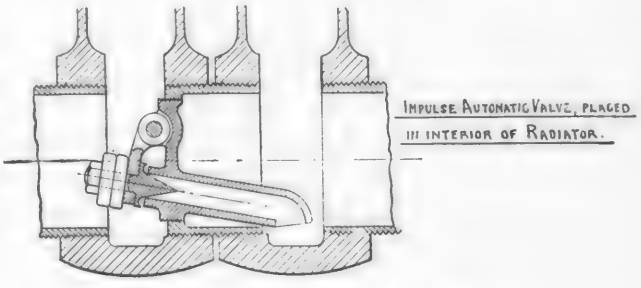


FIG. 6—RADIATOR CHECK VALVE

A NEW SYSTEM OF VACUUM RETURN LINE CIRCULATION

It is believed that the foregoing statement does full justice to the Williames thermostatic or Williames automatic system as now installed. No credit has been given for using the following qualities in order to produce a perfect result in their system: it should pass only water of condensation and the entrained air but no steam; it should be of a kind that

needs no adjustment for different sized radiators or varying differences of pressure betwen the radiator and the return; it should be extremely simple in its construction so that its operation may be readily understood by the running engineer and so that it will not need expensive attention or repairs; it should have only one passage for the removal of air and water. That passage and the valve should be of such design that it will neither stop up nor become inoperative from dirt.

In the best results obtainable the most efficient valves can act only as follows: Pass the water of condensation from a pressure of atmosphere and temperature of 212° into a pressure in many plants as low as 20 inches of vacuum and 160° temperature. Water under these conditions will give off almost 5 per cent. of its weight into steam and this steam will occupy a space nearly three times as large as steam at atmospheric pressure. It will thus readily be seen that if for every 30 pounds of water passed under these conditions through an automatic valve almost 110 cubic feet of steam are generated at a temperature of 160° that a device of this character delivering water only is an impossibility.

The vacuum assumed (of 20 inches) as a fair standard of what is necessary for a rather large plant, causes that difference of pressure between the two sides of the automatic valves nearest the source of supply. As the distance from that point increases the pressure in the supply pipe falls very slowly but the pressure in the return pipe falls very much faster, until at the farthest point in the system there may be from two to four inches of vacuum in the steam main and correspondingly from four to six inches of vacuum in the return main. It is the necessity of creating and preserving this differential (of 2 inches of vacuum or one pound pressure) at this, the most remote point in the system, that has compelled the use of the before assumed 20 inches of vacuum at the pump. Therefore there is a gradually decreasing differential used in all systems, no two valves working under the same conditions.

The drop in pressure in the return main as assumed in the above is from 7 to 9 pounds and in the steam main only 1 to 2 pounds or $3\frac{1}{2}$ to 9 times the drop in the return that there is in the steam. These figures compare very closely with results as observed in plants in operation, the increasing ratio of drop depending not necessarily upon the size of the plant but upon the length of run and the number of units; also upon whether a considerable number of the units are near the source of supply and so subject to the high differential. Thus it will be seen that it would be easier to handle 1,000 units all 1,000 feet away than it would be to handle 500 units close by and 500 units 1,000 feet away.

This extremely large drop in pressure in the return main, caused by the quantity of steam brought back through the return being more than the capacity of the pipe, makes necessary the using of either a large amount of jet water (the cause of the 20 per cent. loss of the early Williames system) or the using of a very large vacuum pump or sometimes both. It has always been the practice to leave the return mains uncovered that some benefit may be obtained from their radiation in condensing the steam in them. This being undesirable in many plants, if it leads to their being covered it is liable to make a failure in circulation in a plant that was before a success.

The size of the vacuum pump, depending as it does upon the length of run, the location and number of automatic valve units and the amount of jet water available varies from two to four times that necessary for a surface condenser handling the same quantity of steam. This notwithstanding the fact that it is seldom pumping against much more than half the pressure and frequently run at quite high speed.

As to some of the mechanical possibilities of remedy.

The Wiliames automatic valve system is a jet condensing apparatus with the jet and the vacuum pump both located at the maximum distance from the automatic water and air removing devices, which may be considered as taking the place of the exhaust valves upon the engine. If it were possible to move this or any substitute condensing or vacuum producing apparatus in its entirety nearer its work it can readily be seen that it would be of the greatest benefit.

In attempting all that can be done in this direction it has been proposed as far as possible to substitute a surface condensing system for the jet condensing, it being borne in mind that though the radiating surfaces themselves constitute a surface condensing system yet their benefit to circulation extends only to the flow of steam into the radiating devices. This benefit does not extend to the production of the lower pressure in the return.

Another proposed addition is to automatically control the difference of pressure between the steam and return mains at enough local points so that the differential will be practically uniform throughout the heating plant.

Each of these propositions assists the other and works harmoniously with it.

As to the control of the differential: In small installations it is well known that there are, for short distances of run and for a limited number of automatic return valve devices, no appreciable differences or losses in pressure. It is therefore proposed no matter how large the heating plant to cut it up into small units by placing in the return pipes differential controlling valves. This valve, by taking pressure upon one side of a diaphragm from the steam main and upon the other side from the local branch of the return main leading from the part of the plant to which the other or steam pipe goes, by an adjustable weight or spring, so governs the motion of the diaphragm and attached valves that any desired differential pressure may be used.

For instance, a local part of the apparatus near the source of steam supply has upon its branch steam main atmospheric pressure and upon its branch return main the full vacuum obtained at the pump 20 inches. It will have therefore upon its 30 or 40 automatic valves a differential of 20 inches of vacuum or 10 pounds. The differential controlling valve, acting in a similar manner to a reducing pressure valve, holds back the flow through the branch return main until its pressure rises ½ inch of vacuum and automatically maintains it there. This will reduce the steam leakage through the leakage ports of the automatic valves from that due to a 10-pound pressure to that due to a ¼-pound pressure and consequently keep a large amount of steam out of the return pipes.

It must be understood that this valve controls the flow both as to not being affected by varying vacuum in the main return pipe and also varies its inlet pressure, or pressure in the branch return pipe, to correspond to the pressure in the steam main. Thus if for any cause the pressure in the steam main goes up one, two, or more pounds, the pressure in the branch return main goes up a like amount. Correspondingly if the steam pressure drops one, two, or more pounds below atmosphere, the return pressure drops likewise, unless the steam goes so far below that the return is unable to follow it.

A controlling valve placed in like manner in other suitable places in the branch returns, the differential is under complete control and can be made uniform if desired or if the steam piping is unusually small in some branches, it can be increased until the desired circulation is secured.

In attempting to copy the methods and obtain the benefit of a surface condensing system with the condenser as near the work as possible, it is proposed to place in the return

from each radiating device immediately beyond the automatic valve enough radiating surface to condense the steam passing through the return valve, the vapor arising from the water passed, and also cool the water and air a definite amount. This will cause the collection in the auxiliary radiating devices and in the return pipes leading from them of a variable amount of air and makes of the combination an automatic mechanical means for the removal of air operating as follows: The initial condition of a lower pressure in the auxiliary radiating devices is obtained by causing the air to flow through the differential pressure controlling valve into the lower pressure of the main return at first faster than it can enter through the leakage port of the automatic valve until the pressure drops the desired amount thus causing the differential valve to act and partially close the passage through it. Thereafter the flow through both valves is of the same amount until the steam enters the auxiliary radiator, heating up its inlet end first and leaving the return end cold, when by condensing it reduces the pressure and so cuts down the air flow until enough of the space is occupied by steam so that its condensation maintains the desired difference in pressure. The differential controlling valve then closes against the passage of air, but it will allow water to pass, which by its static head gathering upon the diaphragm causes it to act the same as a steam trap.

Thus there is passed into the main return only water and air that have both been cooled a controllable amount (depending upon the differential used) and as the return pipe averages in good practice never less than 1-10 the area of the steam main, it is very large for its proper use and will have less drop in pressure than the steam main for corresponding distances.

Now as to an automatic valve for the return of the radiating device. This, in view of the use of the differential controlling valve and a surface condensing system, will have very different functions from a Williames Automatic Valve.

Some years ago when the thermostatic valve was practically the only type in general use the statement was made that some day a valve would be produced that would need no adjustment, no cleaning out, and would not stop up or become inoperative from dirt. There are to-day many valves that will work well upon a Williames Automatic System and which need no adjustment, but they all need cleaning occasionally, for some will stick wide open and others shut fast with dirt. However, different functions and different conditions sometimes make possible what has before seemed impossible. Automatic valves clear themselves of water whenever water collects in the body of the valve. In order that an automatic valve should clear itself from dirt it should open whenever dirt collects in it, that is, if dirt collects in a leakage opening in the seat, the valve should open because the dirt is there and blow the dirt through. This seems an impossible result but still it is quite practicable.

An automatic valve or trap to work upon the Williames Automatic System with varying differentials, must have either a constant force sufficient to open it against the maximum pressure or a force that increases as the pressure increases, such as a pressure operated or motor valve, or it must operate a balanced valve. The first of these is generally a float or bucket valve, and though in heating systems of the Williames type, the steam pressure seldom goes above a few pounds or the vacuum below 20 inches, yet these valves in order to guarantee their working successfully must be capable of opening against a pressure as high as 15 pounds. This makes the floats either quite large or the valve seats quite small. As a consequence the seats in the successful valves of this type are made about $\frac{1}{8}$ inch in diameter and the floats as small as possible to lift over that area with 15 pounds

differential. Pressure operated or motor valves have been very successful, a low differential being sufficient to raise the piston against the area of the valve seat, as the areas used are about 1½-inch piston and ⅜-inch valve seat. Though there have been some attempts to make float valves operate with balanced valves and small float, they have not been very successful. It is possible probably to do so, but the accumulation of grit and dirt would be hard on the balancing piston.

Now that a controllable differential is proposed, a very simple and efficient method of balancing a valve by dead-weight is rendered available and it is proposed to use an impulse operated check valve with a leakage opening between the disk and seat. This opening is calculated to be sufficiently large so that the air may be drawn off in a reasonable time and when water collects it opens the valve by the force of the jet upon the impact surface. Until water or air again collects the leakage opening passes a certain quantity of steam which is taken into consideration in calculating the size of the auxiliary radiator.

If the leakage opening becomes stopped by dirt, the static head of water which collects opens it; the impact serving to keep it open the dirt is blown through. If oil or dirt is collecting in considerable quantity, as in a new plant, the cleaning out of the radiators and valves may be effected from time to time by increasing the differential for a few minutes to its maximum by holding down the lever of the differential controlling valve. Thus the other condition is met and an automatic valve provided that will not need cleaning out, will not stop up, and will not become inoperative from dirt.

One other result is also easily obtainable by these methods. It is possible to place a weight balanced check valve in the base of the radiator, thus dividing it into a primary and an auxiliary radiator, making the size of the auxiliary radiator in each group uniform and quite large in proportion to the primary radiator; also placing a light check valve on the outlet of the auxiliary radiator to prevent heating from the return. Then by the control of the differential in the hands of the operating enginer a differential heating effect may be obtained, varying amounts of the radiator being heated as the outside temperature changes, though still leaving the inlet valve to each primary radiator in the control of the occupant of the room.

Here one other explanation or admission must be made. As a considerable quantity of dirt is invariably present in new plants and accumulating in old ones continuously, this dirt must be removed at some available and necessary point. Therefore there should be placed in the return before the water passes through the differential controlling valve a strainer so constructed that it is easily removable for cleaning. Thus, though the automatic valves need no cleaning or adjustment, a cleaning and an adjustment is necessary at the differential controlling valves, but this is only one place to clean and adjust instead of 30 or 40 and that one is in the cellar where it is easily accessible.

Making a Salesman

"The way to make good salesmen," said a veteran hardware manager, "is to catch them young. I have three good clerks with me, who began as office boys. I tried about thirty youngsters in getting the three salesmen. The American boy is too restless in these days to hold on when he has a chance at a good thing, and wants to let go and go in for something else, and one great trouble is that the average merchant takes too little interest in the new boy, and instead of training him, lets him tumble up any way that may happen. It is a duty an employer owes to a youngster who is put for the time in his charge, that he should help that boy to make a fair start in his business life."—*Hardware and Metal.*

THE HEATING AND VENTILATING MAGAZINE

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THE boiler and radiator business has been more than active for weeks and the manufacturers are as a rule seriously troubled to fill orders. In many cases this is due to a lack of confidence, in the early part of the year, because of the old superstition that a Presidential year must necessarily be a bad business year.

Those concerns who allowed their business policy to be guided by this theory are struggling to keep up with the fall demand. We repeatedly pointed out to them during the summer that this was almost certain to be the outcome and now they are up against it.

Not only is this true, but the rush has come on so hard, and heating contractors have held back their orders so long, that even those who have the goods ready for shipment cannot get them out fast enough. As a manufacturer stated the other day, a warehouse has only a certain number of doors and a line of side track will accommodate only a certain number of cars. All that any manufacturer can do is to keep his track busy getting in empty cars as fast as he can and getting the loaded ones taken away and keeping the doors full of outgoing boilers and radiators. With this, the physical possibilities are exhausted.

ONE consequence of the situation is that those heating contractors who failed to take warning in time and get ahead of the fall rush by placing orders to cover contracts which they had already closed will get themselves into more or less trouble with their customers.

Of course some of the fault is with the customers. It has been the tendency all the year for anyone with a certainty before him of a purchase, or a contract that had to be made, to postpone it from day to day and from week to week as long as possible, for no special reason excepting that that was the feeling in the air. Men who confessed that their judgment told them better, violated their judgment and acted on feeling. They knew, and the result has proved, that when the fall approached everybody wanted his heating apparatus put in at once. Some buyers are seriously delayed in getting their work done, some probably have been unable to get it done at all, and some have got hurry-up jobs which, as a rule, are not quite so well and carefully done as would be the case if the work were put in deliberately and carefully at a time when not much else was doing.

IN the midst of this rush and this difficulty in filling orders, it is amazing to find many heating contractors taking new contracts at unduly low prices, and perhaps still more amazing to find manufacturers making prices on their goods which in their own judgment yield them a very unsatisfactory profit. The only theory upon which this can be ac-

counted for is the desire of salesmen to fill their order books and the anxiety of manufacturers to prevent competitors taking business from them.

A few wise ones feel that even in a comparatively demoralized market condition it is better to let the competitor take the order if it does not yield a satisfactory profit and if there is a doubt as to the possibility of executing the order promptly and with satisfaction to the customer. In other words, if there must be a loss on an order they would rather a competitor would stand that loss, and if there must be an unpleasantness with the steamfitter they would prefer that the competitor should shoulder that unpleasantness.

But, unfortunately, there is still too much disposition to take chances on getting out whole as to prices and jollying a customer so that he will not feel permanently dissatisfied.

A MOVE in the direction of ventilating tall office buildings has been made by an engineering firm, who place in the basement a fan sufficient to produce a plenum condition, or a plus atmosphere, in the halls of the building.

Heretofore the ventilation of offices in skyscrapers has been a serious problem. On the first few floors it is simple; fresh air comes in at the windows and goes out through the transom into the hall. On the top floors an open window results not in an influx of fresh air, but a draft from the hall, of air that has been previously breathed and exhausted by the tenants of lower floors. On intermediate floors the condition is variable.

The new idea involves a fan apparatus that produces an outward flow of air on every floor, and while it is not perfect ventilation, it is likely to produce a great improvement over what has existed in the past.

ALFRED R. WOLFF lately adopted a different device for ventilating tall buildings, but in that case it was the Hotel St. Regis, fifteen stories high, and pretty thorough ventilation was wanted. Fresh air ducts equal to the requirements of the various floors would be so large at the lower floors that a wholly impracticable proportion of floor space throughout the building would be sacrificed to air ducts if the plant was in the basement.

Mr. Wolff, therefore, divided his ventilating plant into batteries of four, placing one unit each in the basement, third, seventh and twelfth floors, with indirect stacks supplied with steam by pipes from the boiler in the cellar.

RECENT labor troubles, so far as the building trades are concerned, have been most conspicuous perhaps in Boston. The Master Builders' Association there have adopted what they call a "program in labor issues." It provides that the owners and managers of a business are the only ones to dictate how the business shall be conducted, and that absolute freedom of choice in employing workmen is essential to the employee as well as to the employer.

A special feature is a list of "registered workmen." The names of these men are to be filed with the secretary by members of the Association and are to include "such workmen as they may consider worthy of recognition by the Association by virtue of skill, interest manifested in work, good habits and reliability."

Conferences will be held with these

men in regard to the relations between employers and employees, including everything relating to wages, hours, shop management, etc. This has at least the merit of containing an excellent suggestion looking toward the mitigation of labor evils.

WE are glad to see that our contemporary, the *Metal Worker*, has taken up the question of a "Sanitary Engineers' Association." The need of such an organization has long been recognized and the probable value of it has been emphasized and made apparent by the excellent work of the American Society of Heating and Ventilating Engineers.

Previous efforts in the direction of establishing such a society have met with some discouragement on the ground that the old-time plumber as a rule feels nothing but hostility and perhaps a little contempt for the sanitary engineer. Some of the older plumbers regard the engineer as their natural enemy—a man whose occupation it is to make the plumber do something that he might otherwise get along without doing.

That might tend to influence some plumbers against joining an organization bearing the name of "Sanitary Engineers," but it must be borne in mind that without the plumbers it would be impossible to organize the society because there are not enough sanitary engineers to make a body of respectable numerical strength.

THE situation recalls the early days of the Heating and Ventilating Engineer's Society. Some of the engineers felt that they would lose cast by joining a society composed partly, if not largely of heating contractors, or steam fitters, while many steam fitters think they are better engineers than some of those who are purely engineers, and their contact with those engineers has been one that they would have willingly dispensed with. Something of that feeling still exists to-day. Some excellent heating engineers, who would promptly join a society composed entirely of heating engineers, hold aloft from the existing society, although we think that in many cases this is partly due to the fact that they did not go in at first and do not like to recede from a position once taken.

At the same time, the Society has increased and prospered and has done excellent work. The National Association of Master Steam and Hot Water Fitters have absolutely discontinued the discussion of technical and practical subjects and confined themselves to their sphere of trade relations and business policy.

THE Plumbers' National Association could well afford to do the same thing. There are master plumbers of high degree—men of national celebrity for the excellence of their work and their prominence not only in their art, but in the engineering and professional side of their business. If such men could attain membership in a society devoted to the best thought and the best work in their chosen line it would be something that they would doubtless appreciate.

The sanitary engineers on their part should be glad to do all that is in their power to further a movement of this kind. It would tend to make prominent their profession, would bring them in personal and social touch with leading plumbers, and in every way would be beneficial.

We trust that the movement will succeed.

SMOKING COMPARTMENT REFLECTIONS

I heard a story in Boston the other day that reminded me of old times. In a certain New England town a contract was awarded this fall for heating and ventilating a building and the contract price was approximately $5,000.

As there were ten bidders, the contest was pretty keen, and presumably the successful bidder will not make a fortune on that job.

The joke, however, lies in the fact that there were ten bidders. That means that ten concerns spent the requisite time for getting the information, making estimates and presumably plans, and each of them having a representative doing more or less work toward influencing the decision in the direction of his firm. If they got off with a hundred dollars each, counting time and all expenses, they did not do very badly. That would be a thousand dollars. There is no reasonable likelihood of there being a thousand dollars' profit in the job, and consequently, if those ten men should repeat that performance and they should all be equally successful, then out of every ten contracts each man would secure one, and when he got it he would get just about even for the expense of securing that one and losing the other nine.

I did not know we were doing that kind of thing nowadays. I remember when all of us used to. I think the worst case I ever heard of was in a little town on the south shore of Pennsylvania, lapped by the waves of Maryland, about fifteen years ago. On a $600 contract there were 30 bidders, coming from Washington, Baltimore, Philadelphia, and one or two from New York, with the interior towns of Pennsylvania and Maryland well represented. It is pretty easy to figure that in that case the expense of securing the contract amounted to a good deal more than the contract price. That, however, was long ago and I supposed we had all got wiser.

A foundryman mentioned to me the other day a novel method of treating the pickets representing some strikers who wished to hamper the work of his foundry.

Returning from lunch, he saw two or three men standing aimlessly around the corner and approaching them, said, "Boys, are you pickets?" With some hesitation they admitted that they were. "Well," he said, "there is no use of your standing here; you may come right over to the shop door and I will have some chairs brought out for you so that you can sit down there and make yourselves comfortable. It must be tiresome standing here, and besides you can probably do better work at a closer range."

Either these particular pickets were somewhat uncertain about the urgency or the effectiveness of the work or else the method is an uncommonly good one, because they faded away.

I was interested in reading the Metal Worker's story of the defective plant at the Columbus, Ohio, state house. I had a similar experience once and sold a boiler on account of it. When our boiler was put in, it was discovered that the Gurney boiler which we had taken out had been rather seriously handicapped by some steamfitter obstructing the main flow pipe with a nice leather gasket having a very small opening.

Fortunately the owner of the building was the owner of a good many other buildings, new and old, and was able to use the Gurney boiler elsewhere. Likewise, it will be noticed that we had a scandalously honest steamfitter, who candidly reported the true cause of the trouble.

CORRESPONDENCE

A Much Needed Paper

Lafayette, Ind., September 17, 1904.

Editor HEATING AND VENTILATING MAGAZINE:

Enclosed find $1.00 for the HEATING AND VENTILATING MAGAZINE from the start. Please send all numbers. Have looked it over and believe you are putting out a much needed paper.

Very truly yours,

J. D. HOFFMAN.

(Associate Professor, Engineering Design, Purdue University.)

Exhaust Ventilation

Editor HEATING AND VENTILATING MAGAZINE:

On page 121 of your September number you refer to the practice of adjusting the area and consequent capacity of exhaust ventilating flues by introducing dampers to be turned off to a certain point, determined by experiment, so that each pipe shall be doing its proportion of the work.

I am one of those "engineers of limited experience" who have frequent recourse to this expedient. I find it an economical expedient. It costs less to pay for a little more galvanized iron and a few dampers than to spend a lot of time figuring a complicated problem which in the end you are—or at least I am—quite likely to get wrong. Therefore I use the dampers.

What I want particularly to say, however, is that I arrange them with set screws, so that when I find where they belong I tighten up the set screws and they stay there.

I presume everybody does this, and that your contributor had it in mind when he wrote his article, but I think it is a point which ought to be brought out to people whose experience is even more limited than mine.

R. T. S.,

Cleveland, O.

Attendance at Summer Meetings

Editor HEATING AND VENTILATING MAGAZINE:

I noticed that at the summer meeting of the American Society of Heating and Ventilating Engineers held at Detroit last July, very few Detroit men were present. I imagine that you have just as many of them at your New York meetings as you had there. How do you account for this?

S. L.

ANSWER:

The New York meetings are well attended for several reasons. People like to come to New York and are glad of an excuse to do so. January is the dull time in the heating business and almost any man can get away; besides, he is sure to meet a large number of people. Detroit was by far the largest summer meeting we have ever had, the attendance at previous meetings having been rather limited. When a man comes to New York, he comes for the purpose primarily of attending the meetings, and he is present at most of the sessions. When the meeting is at his own home, just around the corner, he thinks he will skip the first session and take in the next one, then something interferes or seems to interfere, and that slips away from him.

We are not surprised, however, that this condition excites our correspondent's wonder, as it has that of many others. At the two meetings of the Society, held at Atlantic City for the benefit of the Philadelphia members, it is our impression that at one of the meetings there was one Philadelphian present and at the other not any, while at the Niagara Falls meeting last year no Niagara Falls heating men were present, and only one or two from Buffalo.

The holding of occasional meetings in the West, however, has satisfactorily demonstrated the correctness of the theory, because while the immediate local men do not turn out as they might, the meetings have always drawn a number of western men who had never been seen at New York meetings.

Overwhelmed with Requests

Dear Mr. Smith:

You certainly must have excelled in the matter of write-up regarding our souvenir ashtrays, for we are about overwhelmed with requests for these souvenirs since your article was published. However, we appreciate your good intentions and thank you very much.

Very truly yours,

AMERICAN RADIATOR CO.

Louis Bruch, Mgr. Adv. Department.

Kinks, Crooks and Pitches

Illustrating the effect of greater or less pitch on the rapidity of circulation in a radiator branch in a one-pipe steam system, I once had a 48-foot radiator on an upper floor supplied by a 1¼-inch branch about 2½ feet long, with a crooked thread on the end nearest the radiator, this thread being cut with 1½-inch guide in the Armstrong stocks and giving a pitch of about an inch. On firing up, this radiator heated very slowly, with more or less water accumulating. I gave the branch a pitch of about two inches by cutting another piece with a crooked thread, due to the 2-inch guide, and this time it heated as quickly as any other, and with no nois

With the 2-inch guide on 1½-inch pipe,

I get a pitch of about 5/8 inch to 3/4 inch per foot, and with the 1½-inch guide, 1/4 inch to 3/8 inch. An adjustable guide, such as is sold by some manufacturers, is a great advantage, as it can be instantly adjusted to any variation in size of pipe for a straight thread, avoiding the necessity of a "tin guide" and can also be set for any intermediate degree of crook and to fit the coupling on a nipple chuck. In hot-water work and one-pipe steam branches I always give as much pitch as possible by cutting threads with a guide one or two sizes larger than the pipe. The little extra time and pains required are amply repaid by the satisfaction of a good circulation at first without the necessity of any alterations.

I seldom bend a piece of pipe near the elbow for the purpose above mentioned, though it may take less effort and skill, for this is apt to leave a little pocket at the elbow, and the bending slightly decreases the area of the pipe. With the crooked thread there is a uniform pitch, a neat appearance, and greater ease in securing the desired pitch at the first attempt. With good tools, and pipe of proper thickness and quality, I have seldom found the objection to a crooked thread, urged by some, that the pipe is apt to be cut too thin at the point of deepest cut. Wherever possible—and it usually is possible—I make the elbow on the crooked thread, having the straight thread enter the fitting already in place, avoiding the difficulty of entering and the wabble in turning up a crooked thread. Sometimes, however, there is occasion to give a branch a slight sidewise throw, as well as a pitch. This can be done by having a crook on the entering thread with a crooked thread properly located on the circumference of the pipe at the elbow end. This requires care in keeping the guide in contact with the pipe at the proper point in the circumference when starting the second thread, but by practice it can be done very readily, and a neat, direct connection can be made where the space occupied by nipples and elbows and the friction caused by them would be a detriment, or in some cases prohibitory.

With a crooked thread on the elbow end and the other straight, any lesser degree of crook than the extreme can be secured by turning the elbow to a different point in the crook, and I have frequently used a crooked thread for getting good drainage to a drip tee.

I also take particular pains with every piece of pipe on a job to get a positive pitch, using a good level wherever there is any doubt as to the pitch.

I consider these details among the most important of any concerned in the rapid and noiseless circulation in a steam heating system, it being understood, of course, that the apparatus is properly proportioned as to sizes of radiators, boiler and piping.

ARTHUR T. RICHMOND.

Not "Teddy," but the Magazine

Editor HEATING AND VENTILATING MAGAZINE:

Our business has never been so good during a national election year as it has been this one, in the thirty-four years that we have been in business. It must be due either to the HEATING AND VENTILATING MAGAZINE or to Teddy Roosevelt.

Very truly yours,

JAMES H. BLESSING.
(Albany Steam Trap Co.)

Heating Engineers and Architects

Editor HEATING AND VENTILATING MAGAZINE:

I read with much interest Professor Kinealy's article in your August paper of the relations of the engineer, the contractor and the manufacturer to one another.

I am a heating contractor, or master steamfitter, and I manage to get along pretty well with the manufacturer, but I do have a great deal of trouble with the heating contractor, who in my locality is usually the architect. The point emphasized by Professor Kinealy is just the one that I most frequently find myself up against; the architect does not know what he wants, or if he does, does not know how to tell it. In a very large percentage of cases he has a pretty well defined idea in his own mind, but either does not know how or does not take the trouble to clearly express it. In reality, he knows that I and all other heating contractors know more about the details of the thing than he does, and he expects that we will make good his deficiencies and correct his errors. I think we generally do it pretty well. At the same time, I like to see anything printed that will impress upon these people the importance of finding out what they want and then saying what they mean.

I find that the manufacturer generally feels just as we do in such cases—that he cannot afford to have a mistake made if he can possibly prevent it; and if he gets an order that is at all indefinite, or if one item of it seems to conflict with the rest of the order, he is quite certain to ask some questions about it before he ships the goods and find out if that is what we really wanted, because he knows that if he ships the wrong article, even on a written order, we are going to tell him that we have made a mistake and ask him to take the goods back and give us what we really need. Of course we generally pay the freight both ways, but it makes him a great deal of extra bother, both in his shipping room and in his bookkeeping department.

Therefore we are all of us anxious to get very exact specifications, because if we misunderstand them we are likely in the first place to lose the order by bidding too high, or to lose money by bidding too

low, and in the second place if we have to change the goods it makes trouble for us and for our supply house. L. J.

Editor HEATING AND VENTILATING MAGAZINE:

I notice in your September number what you say about Mr. Perry's ideas in regard to the relation between the employer and the workman. He says, "the intelligent manufacturer does not care how large the wages the workman earns provided they are large enough to satisfy him." I presume this means, to satisfy the workman. I have seen a great many cases where manufacturers and other employers have felt that the workman was making too much money for a workman. They have figured that he had been living at the rate of about a certain price per week or per month, and if any wage scale brought him a big increase the employer began making figures to see how he could reduce it. Do you think this really is the general practice? WORKMAN.

ANSWER

We have known a good many people like that. We know a case where a salesman was put into a certain territory which had previously been wholly unproductive. He was a young man and was sized up by the employer as being worth about $15 a week. He brought in business which on a commission basis would yield him three or four times $15, and after a few weeks the employer insisted that he could not afford to pay so much money. Thereupon the salesman quit and the territory again became unproductive, regardless of the fact that for every dollar the salesman got the employer got nearly a dollar.

Most men, I think, feel that they would like to sit at their desks all day and hand out dollars with both hands, if somebody would in turn hand in a dollar and a dime.

Engineering As a Profession

AN EXPOSITION OF THE NECESSITY OF SCIENTIFIC STUDY

Engineering is a profession, not an art, nor a trade. It is a profession to exactly the same extent as medicine or the sciences or law, and is based upon principles universally true. The knowledge of these principles cannot be acquired by individual experience, nor by lucky discoveries. The experience of thousands of generations, the discoveries of ages and ages, logically arranged by the master minds of the past, constitute to-day these very principles. In order to become proficient these principles must be studied, their knowledge theoretically acquired. A trade can be learned only by actual practice. Skill in blacksmithing or moulding can be acquired only by repeatedly performing the various operations of these trades. Add to this skill the individual conception of the work, the imprint of the worker's personality, and the trade becomes an art. In each case the experience of the individual is essential for the success of the work.

But engineering principles are universally true; you must be conversant with the laws of statics before you can build a bridge or a smokestack; the rules on heat must be studied before you do blast-furnace or steam-engine work. The most skilful application of these principles is a question of experience and talent, as it is also in other professions. An eye specialist will meet with but little success in treating general diseases; a criminal lawyer cannot draw a modern charter; an electrical engineer will build a poor rolling mill. A further requirement is a mind trained in logic, a mind which is taught to think, to grasp and weigh stipulations, to build up mentally a problem in its entirety, all its details, and conceive all conditions governing it and all which are governed by it. We have a number of men, proficient in their respective fields, who have never visited an engineering school, who substitute, as they proudly claim, practice for theory, who have graduated from the shop. These men ought to be proud for having mastered by individual study, perhaps unconsciously, these very principles which are taught in concise and lucid form in our neighboring schools. Such men are the exception—they rank far above the average both in energy and in mental outfit. And for this same reason I do not like these schools where they make you an engineer while you wait. We are overrun to-day by such men. We want honest schools where the average scholar, not the genius, and not the "chump," may acquire honest knowledge by honest work.

Anyone who does not master these broad theoretical principles is not an engineer. Such a man might be able to copy, reproduce what he has done before, but he cannot accomplish anything higher. Engineering teaches us as the highest goal to apply known principles to new problems, to do creative work. This ability to do creative work we offer to the world as the reason for our existence. As you see this world to-day it is the work of the engineer. Where is the progress in the trades, where in art? Greek statues are still the choicest gems of art. Stone masonry and wood carving date back 4,000 years. The early Middle Ages produced masterpieces in wrought iron and bronze, which are far beyond the limit of our modern metal butchers. Slow and conservative has been the progress of medicine and law; and even the sciences have made their progress felt more in a physical than a material way. But humanity was awakened—this old earth all at once swung into a new orbit

—when, some fifty years ago, engineering was recognized as a profession and studied as such. And it is not the man who invents photographs, or talks to the inhabitants of Mars, but the solid rank and file of well-trained, well-balanced engineers, who have wrought in the last hundred years such miraculous, dumfounding changes that the whole development of mankind up to that time seems incomparably slow.

The evolutionist has taught us that the rapid advancement of man began with the substitution of artificial tools for the natural implements. If this is true, we stand on the threshold of an equally momentous step in the development of the world, dating from the day when the engineer taught man to substitute the powers of nature for his own limited strength.

Enginering is a profession—the youngest one—and in one respect has to learn much from her older sisters. Both the law and medical fraternities watch with jealous eyes over the professional conduct of their members; and while they cannot prevent the existence of "shysters" or quacks, they take prompt and proper measures to demonstrate the characters of such men to the public. This ethical aspect of his station in the world, the engineer seems to have overlooked in his mile-a-minute development. His work, whether as an employee or as counselor of his clients, is a confidential one, requiring not only a mastering of his profession, not only skill in the handling of difficult problems, but a high degree of integrity, which alone can inspire confidence and will lend him that dignity which his profession deserves. The public might be dumfounded by the gigantic, or by the daring of your work; but, hearing that you are an engineer, they will look for the overalls and the oil-can. Let us pledge ourselves to guard our standing, to guard our dignity.—*W. Riddle, in Mining and Scientific Press.*

Worth Remembering

For high pressure systems, as high as 10 pounds of coal per hour are required.

One horse power is equivalent to 42.75 heat units per minute, or 2,565 heat units per hour.

One horse power equals the evaporation of 2,655 pounds of water.

966.1 heat units will evaporate one pound of water into steam at atmospheric pressure.

One cubic foot of air can be raised one degree by .02056 of a heat unit.

One cubic foot of air can be raised from 0° to 70° F. by 1.4392 heat units.

A unit temperature is 1° F., or 1-180 part of the distance between the freezing point, 32°, and the boiling point 212° F.

A British thermal unit of heat is the quantity of heat required to raise one pound of water 1° F. in temperature.

A column of water, approximately figuring, indicates a pressure one square inch of one-half pound for each foot elevation.

One hundred feet of pipe at zero will expand about 1¾ inches at 1 pound of steam pressure; at ten pounds pressure, the expansion will be about 1⅞ inches; at 25 pounds, the expansion will be 2⅛; at 50 pounds, the expansion will be 2 5-16; at 100 pounds the expansion will be about 2 11-16. Approximately, each degree Fahrenheit will cause an expansion in a pipe equal to 1,150,000 of its length.

From the Model Boiler Free Library, Copyright by the Whitman Co.

Cost of Ventilation

In a paper read by Mr. William Henman before the Royal Institute of British Architects on the plenum system of ventilation the cost of the ventilation in several British buildings was mentioned.

The Glasgow Art Galleries, supplied with 9,050,000 cubic feet of air per hour by electric power required 66 horse power, cost for power, about $1.450 per year per 1,000,000 cubic feet. The Manchester Technical School, supplied with 12,000,000 cubic feet per hour, providing for 3½ changes hourly and requiring 80 horse power, is charged with $1,308 per year per 1,000,000 cubic feet. The Manchester Midland Hotel, ventilated at a rate of 3 changes of air per hour, corresponding to a supply of 6,000,000 cubic feet in that time, is charged with 40 horse power electrical energy at an annual cost per 1,000,000 cubic feet of $1,308. The Birmingham General Hospital, with 7 changes per hour or 13,000,000 cubic feet supplied per hour required 19 horse power electrical energy and costs about $287 per annum per 1,000,000 cubic feet. The Royal Victoria Hospital, at Belfast, designed by the author, is provided with ventilation in turns of 7 changes, corresponding to an hourly supply of 5,000.000 cubic feet, and is charged with but 5¼ horse power in a steam plant, costing $97 per 1,000,000 cubic feet per annum.

Secretary W. M. Mackay announces that the eleventh annual meeting of the American Society of Heating and Ventilating Engineers will be held at the new Hotel Astor, Broadway and 43d St., New York, January 17, 18 and 19, 1905.

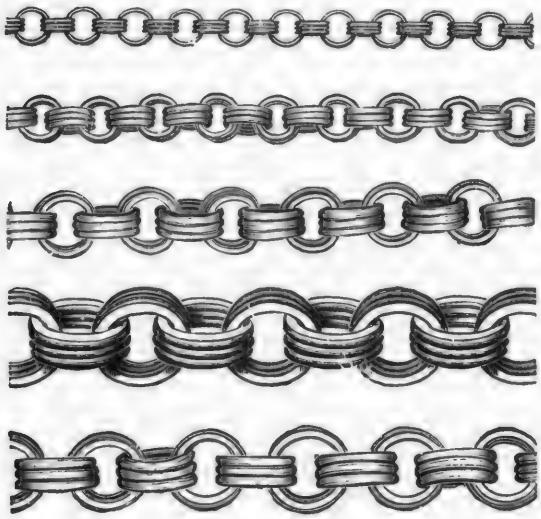
It is the desire of the Board of Governors that as many members as can possibly do so should attend this meeting and contribute to its success, by preparing a paper on some subject connected with this branch of engineering, or by furnishing some topics for discussion, which would be interesting to the members and of value in the society's published proceedings.

Papers to be presented at this meeting should be in the hands of the Secretary as early as possible, so that they

can be passed on by the committee on publication and advance copies printed and forwarded to the members in time to allow them to prepare a discussion on them before the meeting.

A Strong and Flexible Chain

The Universal Double Jointed Chain, of which illustrations are here shown, is manufactured by the Wire Goods Company, of Worcester, Mass., U. S. A., and has made a most favorable impression in



UNIVERSAL DOUBLE JOINTED CHAIN

the market, not only in the United States, but in other lands. It is offered in five different kinds, plain steel, retinned, nickel plated, brass plated, and solid brass; the first being the cheapest variety, and the last the more expensive. It is also in five sizes, the links being from 3-16 to ½ an inch, the latter forming an unusually strong chain. The "Universal," it is claimed by the makers, is ornamental, strong, and flexible as a piece of twine. It can never kink or snarl, but is always free and pliable in any position, and will bend at all angles.

It is specially adapted for heating and ventilating apparatus, for plumbers' chain and for sash weights. When great strength is required, the manufacturers recommend the retinned chain, as the process of retinning solders each joint into a solid link, and makes it very strong. Actual tests demonstrate that the half-inch steel chain will withstand a strain of 200 pounds, while the retinned article will sustain 400 pounds, or double the strain.

The illustrations show the "Universal" in its full size. It is packed for shipment, 100 feet in a box, or 500 feet on a reel, as specified in the order.

Thatcher Boilers

The Thatcher sectional steam boiler is constructed, as will be seen by the accompanying illustration, with side and top headers connected with screw nipples to each section. The manufacturers consider that while this form of boiler costs more to manufacture than the push nipple type, it is a great improvement over that type. The outside headers bring all the connections outside of the fire chamber, greatly reducing the possibilities of internal leakage sometimes caused by expansion and contraction, or by poorly made joints.

In every make of boiler there is sure to be an occasional leakage from one cause or another, such as careless handling or a concealed sandhole. In such cases the advantage of the sectional construction becomes apparent, as a section can be cut off quickly without removing it, and the boiler run with that section empty and not working until it becomes convenient to let the fire out and put in a new section.

The surface of the Thatcher boiler is divided into deep vertical water-ways over the fire chamber, placing a very large and effective surface directly in contact with the fire. These vertical water-ways have open flues at the top, giving additional surface and compelling the smoke and gases to pass completely through and around them, thence to the back of the boiler. It then travels through the horizontal flues to the front and then again through an upper tier of horizontal flues to the smoke hood at the rear, thus utilizing the largest possible percentage of heat units obtainable. The absorbing surface—that is, the large hanging surface exposed directly over the fire—and the flue surface are correctly and scientifically proportioned to absorb the greatest amount of heat units for the minimum quantity of fuel. The Thatcher is claimed to be decidedly more economical than boilers having nearly all direct fire surface and insufficient and ineffectual flue surface to utilize the product of combustion.

Ample space is provided between each section for expansion and contraction; besides, the sections are held together by the top and side headers or manifolds with nipple connections. The makers consider this an improvement over boilers held together by rods and bolts which are frequently made so tight and rigid as to cause sections to crack.

Instead of a separate front, or door frames, the front section is fitted with countersunk lugs securely fastened by bolts, to which are attached the doors. In case of breakage these lugs are easily replaced at a very small expense. Besides, a separate front is liable to warp or crack, often preventing doors from fitting closely.

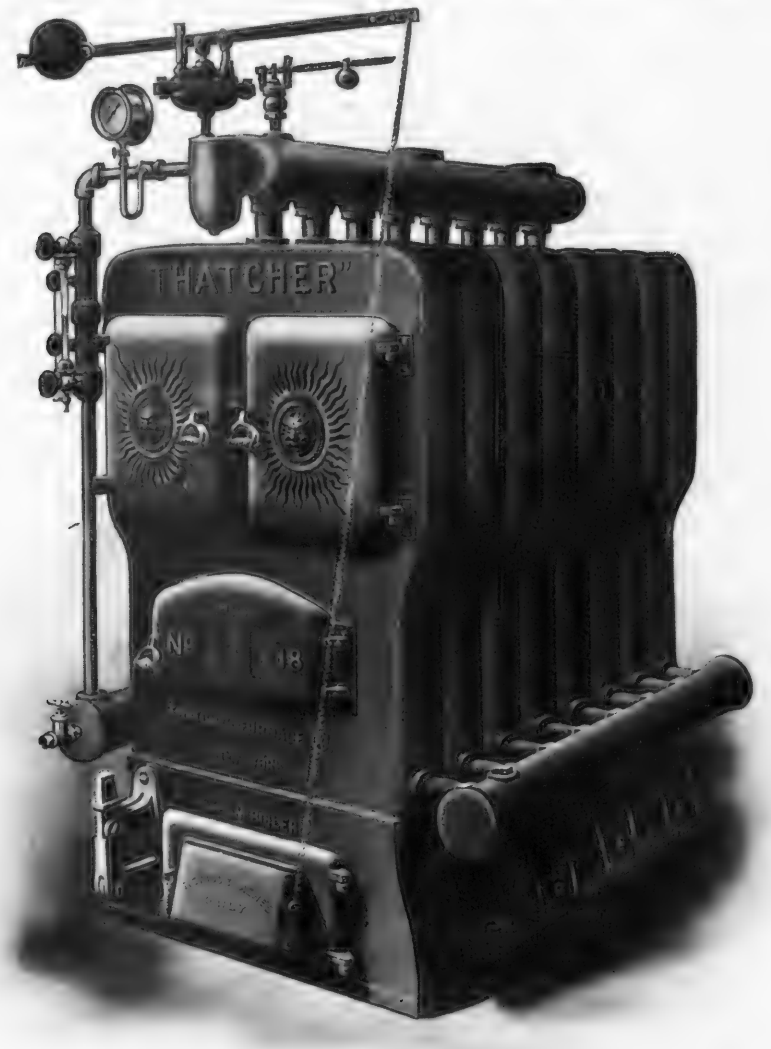
The "Thatcher" grate is the result of

considerable experimenting, it being one of the most important parts of a boiler. The results have been very satisfactory in every respect and the trade have heartily endorsed it as a perfect success. It is easily operated, durable, and ample air space is provided for combustion. The grate bars are rounded on top and the teeth are on an angle in order to cut

The ratings of the Thatcher boilers are conservatively made in accordance with accepted standards.

All boilers are thoroughly tested to eighty pounds hydrostatic pressure before leaving the works.

All direct fire surface is self-cleaning and the flue surfaces can be easily cleaned through large doors in front without in-



THATCHER STEAM BOILER

any clinkers and thoroughly clean the fire. The grate-bars are interchangeable and can be dropped into place through feed doors—no cotter pins or bolts being required—or by drawing the grate frame through the front of ashpit, which is a very simple operation. The ashpit is of ample depth and is fitted with large doors for the removal of ashes.

terfering with the operation of the boiler.

The Thatcher is one of the easiest boilers on the market to set up. Sections can be taken into a building through any door or window.

The boiler is very substantial and attractive in appearance. It is carefully fitted and the castings are smooth and well finished.

The top header or manifold furnishes an independent steam space in addition to the usual space in the section, insuring perfectly dry steam with greater economy in fuel, and also prevents the rising of water into the mains and risers.

The "Thatcher" Sectional Hot Water Heater is similar in construction to the "Thatcher" Steam Boiler, and the sectional illustration above shows the arrangement of flues and fire travel, also a view of the general interior construction.

The numerous water-ways in this heater provide ample space for the water to ascend freely and rapidly, creating a positive and uniform circulation through every part of heater under all pressures with the greatest possible economy in fuel, and also prevents the accumulation of sediment, reducing the friction to a minimum.

The capacities of these heaters can be increased any time by adding additional sections when greater heating power is required. This is a great advantage when additions are made to buildings and to the heating plant, and often does away with the necessity of purchasing an entirely new heater.

This line of boilers is made by the Thatcher Furnace Co., 240 Water street, New York.

The Heating and Ventilating Magazine

One of the interesting features of the National Convention was the début of a new trade paper, THE HEATING AND VENTILATING MAGAZINE, which elicited many complimentary expressions. The magazine is edited by Mr. H. A. Smith, whose experience and ability as a trade journalist give every assurance that the paper will attract a wide circle of readers. We take pleasure in extending a hearty greeting to our new contemporary and bid it Godspeed in its chosen field.—*Official Bulletin M. S. and H. W. Fitters.*

Peat Making by Electricity

By a new treatment recently patented in England it is claimed that raw peat can be converted within a few hours into a substance of high calorific value. The peat cut from the log is carried to the operating plant and packed into rotary iron cylinders. Large quantities of the water contained are expelled by centrifugal force. Electrodes are then inserted in the cylinders and connected by wires with the dynamo, so that an electric current may pass through the peat, disintegrating it into the smallest particles and yet without diminishing any of its primary qualities as a combustible. The peat is then kneaded into a plastic state and molded into bricks or slabs, which are claimed to be cheaper than coal and to be almost smokeless and free from cinders.

Standardizing Catalogues; Preventing Waste, Promoting Efficiency

American manufacturers of mechanical goods have long since recognized the advantages of standardizing their wares, and the "hit and miss" sort of product would to-day have a hard road to success. The prime reason for this "standardization" has been to render the goods more practical. An example of this standardizing process may be found in taps and dies for threading bolts and nuts. By their use we find it possible to purchase bolts and nuts at random with the full assurance that they may be interchanged, the nut of one bolt fitting perfectly upon another. Anyone will admit the necessity for and advantages gained by these changes, as they have brought order out of chaos. Why not, therefore, apply some of these common sense principles to the production of literature necessary in the marketing of your products?

If the manufacturer, in the development of his advertising literature, would only stop to think that his circular, pamphlet or catalogue is to become a unit of some library of catalogues, in which there may be several hundreds or even thousands of these units, he would then realize that in order to make his literature of the utmost practical value he should make it of a size that can be readily filled with others for reference. He cannot to-day issue a pamphlet four inches by six, and next month issue a catalogue twelve by fifteen inches and expect that they will bring him maximum results.

Some months ago the writer carefully inventoried a catalogue library of the purchasing department of a large manufacturing concern for the purpose of arriving at some definite conclusion as to the sizes most generally used. The figures developed by this investigation are most interesting and show the lack of thought given by manufacturers to this class of work. There were 1,835 catalogues and pamphlets in the library and 857 distinct sizes. Any size from a "flier" 2 inches by 4 inches to the blanket circular of the full size of stock sheets of paper seemed to be represented. The prevailing was 6 inches by 9 inches or sizes closely approximating those figures. I say "approximating" for the reason that printers do not seem to recognize the necessity of accurate trimming. Variations of a quarter or half an inch from specified sizes are common unless a printer has learned by dint of experience that sizes specified must be adhered to accurately or rejected work follows. Other prevailing sizes were 3½ inches by 6 inches and 9 inches by 12 inches, ranking in the order named.

The investigation also showed that some manufacturers already recognize the value of a uniform size for all their literature. They are undoubtedly reaping unsual benefits, as such literature is usually preserved

for reference and nearly always may be found filed in one place. But while they have recognized the value of a uniform size for their own literature, little consideration has been given to what others are doing along these same lines.

The trend, however, is toward a few uniform sizes as is evidenced by the movements which have been started from time to time with a view to arriving at what sizes should be adopted. That these movements have had beneficial effects is shown by the prevailing sizes in the library above referred to, as the sizes mentioned are, in every case, those which have been recommended. These sizes are 3½ inches by 6 inches, 6 inches by 9 inches and 9 inches by 12 inches, and from these three dimensions six distinct types or forms may be developed, as is shown by the following table:

TABLE OF STANDARD SIZES FOR PAMPHLETS AND CATALOGUES

Dimension of BINDING EDGE in inches	Dimension of TOP AND BOTTOM EDGES in inches
3½	6
6	3½
6	9
9	6
9	12
12	9

By carefully considering the character of illustrations necessary to the proper treatment of a subject one of these forms may be chosen that will fulfil every requirement. The perfection to which cut making has been brought makes it perfectly feasible satisfactorily to illustrate even the largest subjects in the 6 inch by 9 inch catalogue. Where many large dimension drawings are involved the 9 inch by 12 inch size may be desirable. I have found it unnecessary, however, to use anything larger than 6 inch by 9 inch catalogues and have successfully handled subjects having outside dimensions of more than forty feet.

The most convincing argument for "standarization" is to go to any file of catalogues. I say "file," although the word "heap" would, in most cases, be the more accurate term. The difficulties of satisfactorily filing are such as to baffle the efforts of any but experts in office system. In fact, the difficulty is so great that catalogues are usually dumped upon tables or into drawers, no effort being made to arrange and index them. Where constant reference must be made to them, as in large purchasing departments, the systematic filing and indexing becomes a necessity. Shelves, drawers, filing cases and scrap books are called into play, and with an elaborate system of indexing and cross-indexing the information sought can usually be found. The work involved, however, is more than the majority of concerns can find time for.

Picture in the mind's eye a catalogue library containing but four compartments —one for catalogues or pamphlets measuring 3½ inches on the binding edge— one each for 6 inch, 9 inch and 12 inch books. Would it not be pleasing to look upon? And the facility offered by such a file, even with no index, would be appreciated by everyone using catalogues. There would be no necessity for elaborate and expensive cases containing a multitude of compartments and drawers. In place of these we should have cases with shelving varying in height between the shelves to accommodate the four sizes last referred to, all catalogues would file according to the binding edge or back.

I urge manufacturers carefully to consider these suggestions. They point to a way in which the present tremendous waste of catalogues, due to difficulties in filing and preserving, can be effected. Do all in your power to bring about this much desired change in advertising literature. Get suggestions from manufacturers; know that they are now or purpose in future to adhere to standards here given. Publish the names of these manufacturers in the belief that it will influence a decision by others and may assist in the distribution of their literature. It is a positive fact that some concerns seek and preserve catalogues of standard sizes, while mongrel sizes are usually dumped in the waste basket. Could anything more be said?—*Frank G. Bolles, in American Industries.*

Advertising in the trade paper is as much a matter of interest, instruction and benefit to the subscriber as the columns of reading matter that accompany it. The nearer complete the advertising matter contained in a trade paper, the stronger its position with its subscribers who buy and read this paper to keep in touch with the inventions, improvements and novelties that are continually being offered to the manufacturer, dealer and interested parties.—Trade Press List.

Central Supply Association

The fall meeting of the Central Supply Association was held at the Planters' Hotel, St. Louis, October 26.

This association was started at the Victoria Hotel, Chicago, in 1894, with thirty-eight members and its present membership amounts to one hundred and forty-six concerns and about forty branch houses.

Among those present were: George E. Downe, American Radiator Co.; W. E. Clow, Jas. E. Clow & Sons; J. D. Hibbard, John Davis Co.; James Harvey, A. Harvey's Sons Mfg. Co.; C. E. McCullough, Western Tube Co.; H. L. Andrews, Anchor Sanitary Co.; H. A. Leslie, Kelly & Jones Co.; H. G. Wentworth, Pittsburg Valve & Fitting Co.; N. O. Nelson, N. O.

Nelson Mfg. Co.; Jos. F. Grosswiller, Grosswiller Supply Co.

The following officers were elected for the ensuing year:

President, J. B. Rahm, United States Supply Co., Omaha, Neb.

First Vice-President, J. M. Young, Pitt Supply Co., Pittsburg, Pa.

Second Vice-President, Frank Collins, National Supply Co., Toledo, Ohio.

Treasurer, Edw. F. Niedecken, Hoffman & Billings Mfg. Co., Milwaukee, Wis.

Secretary, Paul Blatchford, 1610-11 Ashland Block, Chicago, Ill.

The Executive Committee consists of the above officers and Theodore Ahrens, Jr., Geo. H. Merkel, Otto F. Felix and A. D. Sanders.

Trade Golf

The Eastern Trade Golf Association held the fall tournament at Richmond Hill Golf Links, October 6. There were fourteen players entered and the winners were as follows:

CHAMPION CLASS

Frank B. Barrett 90
E. C. Molby 98

SECOND CLASS

George Bridgeman 118
Chas. McInnes 126

THIRD CLASS

P. H. Seward 125
A. A. Ainsworth 132

FOURTH CLASS

Frank A. Bucknam 137
J. J. Blackmore 146

Captain Barrett won the challenge cup for the second time, the championship cup and the handicap cup, while M. E. Kennedy succeeded in producing a score which entitled him to the famous Duffers cup. Frank C. McLain was unfortunate, making a score not quite good enough to give him a championship class prize, and too good for one of the second class prizes.

The courtesy of the links was extended through the influence of former President E. C. Molby, who is a prominent member of the Richmond Hill Golf Club.

New York Trade School

The fall term of the New York Trade School has started. The evening classes opened Monday, October 10. The day classes start in January and every ambitious young steamfitter should avail himself of the benefits to be derived from an attendance at this excellent institution.

Catalogues may be had from the New York Trade School, 1260 First avenue, New York.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Secretary Mackay, of the American Society of Heating and Ventilating Engineers, has a number of applications for membership and a ballot will shortly be sent out.

A committee of the society lately visited the new Hotel Astor and perfected the arrangements for the meetings of the society in January and for the annual dinner, January 19.

A number of good papers have been promised and it is expected that the next meeting will be exceptionally interesting.

NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS

The National Association of Master Steam and Hot Water Fitters is in a most flourishing condition and is receiving constant accessions to its membership. There seems to be unusually widespread interest in the Association and the officers were surprised the other day by receiving applications for membership, accompanied by the regulation fees, from a bunch of master steamfitters at Albuquerque, New Mexico.

In order to further push along the work of the Association, W. A. Davis has been employed as special representative to do outside work. Mr. Davis is experienced in this line, having served for years as special representative of the National Manufacturers' Association.

Directory of Societies

American Society of Heating and Ventilating Engineers. Secretary, W. M. Mackay, 235 Water street, New York. Annual convention, New York, Jan. 18-20, 1905.

American Society of Mechanical Engineers. Secretary, F. R. Hutton, 12 West 31st street, New York.

Association of Engineering Societies. Secretary, John C. Trautwine, Jr., 257 South Fourth street, Philadelphia, Pa.

Society for the Promotion of Engineering Education. Secretary, Prof. C. A. Waldo, Purdue University, Lafayette, Ind.

American Society for Testing Materials. Secretary, Prof. Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

American Institute of Electrical Engineers. Secretary, Ralph W. Pope, 95 Liberty street, New York.

National Association of Master Steam and Hot Water Fitters. Secretary, H. B. Gombers, 260 West Broadway, New York.

American Foundrymen's Association. Secretary, Richard Moldenke, P. O. Box 432, New York.

TRADE AND MISCELLANEOUS NOTES

LAWRENCE A. REID, of McCarthy & Reid, heating contractors, Lawrence, Mass., died September 26.

HENRY A. GOUGE, a well-known ventilating engineer, of New York, died at his home, New Rochelle, N. Y., October 9. He invented a safety car heating apparatus from which he realized a fortune; he also patented a ventilating apparatus for schools and public buildings. Mr. Gouge was 76 years old.

FREDERICK A. BROAD, of the well-known supply house of Sales & Broad, 76 Jefferson avenue, Detroit, died from heart failure September 16, at the age of 34.

L. W. SUMNER, president of Sumner & Goodwin Co., Boston, Mass., died October 14, at the age of 57.

T. B. CRYER CO., 249 High street, Newark, N. J., has been incorporated to manufacture valves, etc. Capital stock, $10,000.

EBBS & JOHANNES are a new concern at 105 Niagara street, Buffalo, N. Y.

CENTRAL HEATING CONSTRUCTION CO., St. Louis, Mo., has been incorporated with a capital stock of $10,000.

WESTCHESTER HEATING & ENGINEERING CO. is a new corporation of Yonkers, N. Y.

ELK PLUMBING & SUPPLY CO., Charleston, W. Va., is a new jobbing company in heating, plumbing, gas and water goods. Capital stock, $10,000. Incorporators, W. T. Thayer, Stephen Shannon, Stephen E. Shannon, J. D. Canterbury and Maude Canterbury.

SCOTT NATIONAL RADIATOR CO., Marion, Ind., is a new corporation; capital stock, $25,000.

ILLINOIS MALLEABLE IRON CO., Chicago, Ill., has been incorporated by Henry C. Bullock, James E. Bullock and James D. Sheahan. Capital stock, $452,900.

KITTS MFG. CO., Oswego, N. Y., has been incorporated by W. A. Kitts and a number of associates with a capital stock of $10,000.

WATSON HEATING CO., Marinette, Wis., has doubled its former capital stock of $4,000. The officers of the company are: President, A. C. Merriman; secretary, M. J. Culman.

MURPHY & SEARS, 59 Friend street, Gloucester, Mass., is a new heating and plumbing concern.

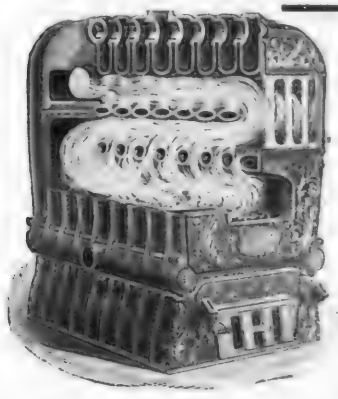
AMERICAN BLOWER CO., Detroit, Mich., have opened a branch at Atlanta, Ga., with an office in the Empire building.

ALBERT E. KUNZELMAN & CO., 61 Main street, New London, Conn., succeeds C. C. Kunzelman.

ECONOMY HEATING & LIGHTING CO., Detroit, Mich., has been incorporated by Geo. F. Albro, William Bayer and Edward Whitmore with a capital of $5,000.

WESTCHESTER HEATING & ENGINEERING CO., Yonkers, N. Y., has been incorporated by John Cullom, M. H. Hannahan and E. G. Conick with a capital stock of $10,000.

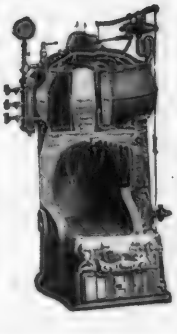
L. B. HARTUNG CO., Canton, O., is a new incorporation of a heating and plumbing concern with a capital of $16,000.



WALKER BOILERS

GOOD BOILERS THAT'S ENOUGH

WALKER & PRATT MANUFACTURING COMPANY BOSTON, MASS.



JAMES T. GANNON CO. succeeds the T. H. McCormick Steam Heating Co., Wallingford, Conn.

F. K. HUSTON succeeds the American Heating Co., Rockford, Ill.

WILLIAM J. O'NEILL succeeds the firm of O'Neill & Curtin, New Haven, Conn.

F. K. HOUSTON succeeds the American Heating Co., Rockford, Ill.

STOWELL MFG. CO., South Milwaukee, Wis., succeeds the Midland Iron Works, Racine, Wis.

NATIONAL VALVE CO., Sandusky, O., have increased their capital stock by $15,000.

BRADEN-O'NEILL PLUMBING & HEATING CO., 223 Losoya street, San Antonio, Texas, succeeds the Braden Plumbing & Heating Co.

GORDON PLUMBING & HEATING CO., 724 E. Forty-seventh street, Chicago, succeeds Daniel C. Gordon.

RICHMOND HEATING & PLUMBING CO., Des Moines, Ia., have made an assignment for the benefit of creditors.

DREXEL HEATING & PLUMBING CO., West Point, Neb., heating court house.

SANITARY HEATER CO., Portland, Me., has been incorporated with a capital of $800,000. M. W. Baldwin is president, and J. J. Hernan, treasurer of the company.

ANDREWS MFG. CO., Boston, has been incorporated with a capital of $15,000 to manufacture steam specialties. The incorporators are Alfred C. Adlere, of Waltham; Francis M. Andrews, of Manchester, and Samuel W. Culver, of Boston.

McLEOD CO., 75 Fulton street, Chicago, a $200,000 company engaged in contracting for steam power plants, has gone into bankruptcy. Among the large creditors are Crane Co., Western Valve Co. and A. A. Griffing Iron Co.

ARTHUR McGONAGLE CO., New York, has been incorporated with a capital of $25,000 to do sanitary engineering. The incorporators are Arthur McGonagle and E. H. Hobby, of New York city, and F. J. McGonagle, of East Orange, N. J.

JAMES S. SULLIVAN, formerly with Buerkel & Co., has started in the heating business at 54 Whittier street, Boston.

STEAM and hot water catalogues are wanted by William B. Dugan, Butler, N. J.

The Albany Return Steam Traps

have been the **STANDARD** for over **THIRTY-TWO YEARS.** For returning water under pressure to the boiler, they will perform this duty fully as well, and in many cases better than the so-called steam loop.

Send for circulars A, B, C and D.

MANUFACTURED BY

ALBANY STEAM TRAP CO., ALBANY, N.Y.

FREDERICK TOWNSEND, PRESIDENT

JAMES H. BLESSING, GEN. MGR.

KENT'S ENGINEER'S POCKET BOOK

A REFERENCE BOOK OF RULES, TABLES, DATA AND FORMULAS FOR THE USE OF ENGINEERS, MECHANICS AND STUDENTS

The Standard Book of Reference. 1100 Pages

Price $5.00

HEATING AND VENTILATING MAGAZINE

1123 Broadway, New York

PAUL VALVES, made by the National Steam Specialty Co., 232 E. Washington street, Chicago, are claimed by them to be the latest improved type of Paul valve on the market. This company also make other varieties of automatic air valves, description of which will be sent to any jobber of steam specialties or to any hot water fitter on application to the manufacturers.

CHAMPION ENAMEL WARE WORKS, at Blairsville, Pa., of the Kellogg-McCrum-Howell Co., were damaged by fire the other day, but the loss was well covered by insurance and the delay in business is insignificant.

NATIONAL TRADE MAILING LISTS, I. Wilson, proprietor, have removed to 711 Browning building, Broadway and 32d street. These lists are frequently revised, and include heating and plumbing contractors and jobbers, architects, etc.

KELLOGG-McCRUM-HOWELL CO., New York, have opened two new branches, one in Cincinnati, which is in charge of F. B. Bassett, formerly manager for James B. Clow & Sons, Chicago. The office will be in the Neave building, 104 W. Fourth street.

A Cleveland office will be in charge of Henry F. Gardner, and the office will be at 1026 Rose building.

FOWLER & WOLFE MFG. CO., Philadelphia, Pa., ask everybody to please note. They ask it in large type and red ink, as if they meant it. All their quotations are to be withdrawn November 1 on the ground that profits at existing prices are so small that any advance of pig-iron, which is not an impossibile contingency, would wipe them out.

LAWLER REGULATOR CO. have removed to 158 Wooster street, New York.

ANCHOR PASTE CO., Pratt and Eighth streets, Baltimore, Md., sell Anchor Paste Flour in cans of various sizes designed for fastening asbestos sheathing to pipes and boilers. The company seems to have an excellent article.

NIAGARA RADIATOR CO., North Tonawanda, N. Y., are making good progress with their new line of blower fans and have already received a number of gratifying orders and are turning out good work.

H. W. JOHNS-MANVILLE CO., 100 William street, New York, have engaged R. C. Rutledge to manage their contract department.

HENRY S. DOWNE, European manager of the American Radiator Co., arrived on the St. Paul Sunday morning, October 23. He will remain on this side for several weeks.

"Sunrays" are pleasant in Winter

Why not use Sunrays in your business?

We will make it pleasant and profitable for you to use them.

The J. L. Mott Iron Works

84-90 Beekman St., New York

D. M. NESBIT, formerly of New York and London, but lately of London exclusively, has again consented to spend a little of his time in New York. He will tell his many friends on this side about the work of Ashwell & Nesbit, Ltd., the British Institution of Heating and Ventilating Engineers and the various other interests with which he is connected.

E. R. SOLEAU, 72 Halsey street, Newark, N. J., had the unpleasant experience of a $6,000 or $7,000 fire, October 3.

GEO. E. FENN, 94 Blackstone street, Boston, Mass., manufacturer of rotary ventilators, had a small fire last month, resulting in no very serious damage.

HOY & CO., 18 Green street, Albany, N. Y., dealers in steam, gas, plumbing and water goods, had a fire last month which cost considerable water damage, all covered by insurance.

NIMBLE SHIPMENTS of boilers and radiators are being made by the American Radiator Co., Chicago, and they are proud enough of the fact to tell about it.

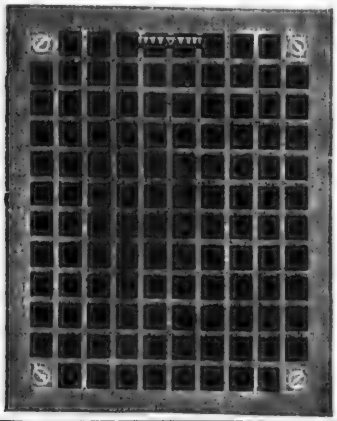
GIBLIN & CO., Utica, N. Y., undertake to produce "heaters to satisfy your customers." They have been doing this for years and it is proper that they should make the claim.

MERCER BOILERS are so well known as hardly to need describing, but we find scattered around the country a pretty buff-colored booklet designed to impress upon the house owner the superlative merits of this old line. We suppose that the pamphlet is prepared and issued by the H. B. Smith Co., Westfield, Mass.

HAVE YOU HEARD the news from Swat? The Ahkoond of Swat and two or three other notables of the staff of the K. McC. H. Co., 48 E. 20th street, New York. This galaxy of freak sovereigns call us an "illustrious son of the morning" and send us a greeting. Looking on the other side for the key, we find dismal looking owls, some swiftly moving camels and some strange looking fowls which are neither stork nor flamingoes nor pelicans, but all of them, owls, camels and birds, seem to suggest that we look inside, where we find conversation about Richmond heaters, Richmond furnaces, Uniontown radiators and Penn enamel ware.

Those who do not get one of these cards can perhaps prevail upon the Kellogg-McCrum-Howell Co. to send them one.

CRANE CO., Chicago, issue a little book of half-tones illustrating their exhibit at the Louisiana Purchase Exposition, where they made an extraordinary display.



Kernan Registers

ALL SIZES AND FINISHES
WE CAN SAVE YOU MONEY

Syracuse Stove Works,

SYRACUSE, N. Y.

Telephone, 383 John.

NEW YORK BRANCH,
231 Water St.

ELMO AIR VALVES

AUTOMATIC FLOAT

LOCK SHIELD AUTOMATIC FLOAT

First class, high grade goods. Close by flotation and expansion. Many special features of excellence which will be readily appreciated : : :

PHELPS BROTHERS

210 Water Street New York

U. S. RADIATOR CO., Dunkirk, N. Y., send us an accordeon-plaited circular, describing Triton and Chautaqua radiators in various sizes. Also Triton wall radiators and the Perfect Pin radiators.

A HANDSOME colored hanger is sent out by the U. S. Heater Co., Detroit. It is 14 by 22 inches, on heavy white board, and represents the latest construction of the Capitol boiler with the sections opened up to clearly show the fire travel. It is a suitable decoration for any steamfitter's office.

REGULATION for hot water tanks is the subject of an attractive little booklet of the Powers Regulator Co., Chicago and New York. This kind of regulation is obviously conducive to great economy in a line that is frequently neglected.

CRESCENT HEATERS, for hot water and steam are described in a small book sent out by the manufacturers, Blake & Andros, 28 Portland street, Boston. The cover is a striking red with a still more striking crescent imprint, the beauty of which is due to an illuminum bronze of extraordinary quality manufactured by Blake & Andros.

The booklet also describes the "B. & A." valves and specialties, a notable feature being the Straightway B. & A. Valve. Copies will be sent on application.

AMERICAN RADIATOR CO., Chicago, invite special attention to their sanitary school pin indirect radiator, and description of which will be sent on application. It seems to be a very creditable construction.

NATIONAL STEAM SPECIALTY CO., Chicago, send us a copy of their latest automatic air valve circular, which shows their improved Paul valve. Copies will be sent to any heating contractor or dealer in steam specialties by addressing the company at their office, 230 E. Washington street, Chicago.

SMITH & THAYER CO., 236 Congress street, Boston, Mass., send out a new thing in the way of mailing cards. It is really a folder, and according to the way it is opened it shows the company's store front and show windows or the interiors of their offices, show rooms, machine shop, etc.

AMERICAN RADIATOR CO., Chicago, issue a clever mailing card showing three lines of railways. By taking one line, a man arrives at stoves, by another line he arrives at hot air furnaces, but the preferred class go to the station labeled hot water and steam heating.

"STEAM BULLETIN NO. 11" describes the branch steam trap made by the National Equipment Co., Holland Building, St. Louis, Mo.

Hub Heating Apparatus

SUPERIOR IN DESIGN, CONSTRUCTION AND EFFICIENCY

HUB STEAM HEATER

HUB HOT WATER STOVE

HUB FURNACE

Manufactured and Warranted by

SMITH & ANTHONY COMPANY, BOSTON

"RADIATORS" tells the whole story on the cover page of the handsome new radiator catalogue issued by the Kellogg-Mackay-Cameron Co., Chicago.

The frontispiece shows the company's main offices at Chicago, and their various offices, warehouses and factories there and elsewhere.

The first pages of the book are devoted to the well-known Acme and Corinth radiators, of various heights and sizes and assembled in different manners to meet various requirements. Then there is the Federal, a six-column window radiator. In these radiators the sections are put together by a simple slip nipple. The castings are smooth, uniform in thickness and tastefully arranged. The Federal is made in five heights, 13 to 20 inches and the Kewanee in six heights, 18 to 45 inches.

The Acme and Corinth patterns have been improved and are furnished with drop hubs when desired.

Then there are the Kewanee, one, two, three and four column, the Acme pin, K. M. C., and Model indirect radiators.

One page is devoted to the method of installing indirect radiators, the Acme pin being used in this illustration. Another page is devoted to "roughing in" measurements of radiators, most carefully calculated and valuable to the fitter. The rest of the information in the book is of a kind calculated to make it easy for the purchaser to make his specifications and write his order without the possibility of a mistake.

VALVES AND GAUGES FOR 1905, is the anticipatory suggestion on the prettily engraved cover of the National Steam Specialty Co.'s new catalogue.

All kinds of gauges—altitude, combination water pressure, compound vacuum, illuminated steam gauge, pressure gauges, ets.

Air valves constitute a prominent feature. There are Paul valves and a full line of automatic air valves.

Copies of this interesting and useful catalogue will be sent on application to the manufacturers at their office, 230 E. Washington street, Chicago.

Heating Contracts

NEW BEDFORD BOILER & MACHINE CO., New Bedford, Mass., heating and ventilating sixteen-room school building.

P. A. BARNHARD PLUMBING & HEATING CO., Pittsburg, Pa., heating hospital and school, Johnstown, Pa.

THE ÆOLIPYLE

When applied to the Smoke Collar of a Furnace

SAVES Time, Labor, Coal.

PREVENTS Escape of Coal Gas.

GIVES Additional Heat and an even Temperature night and day.

Recommended by Furnace men. Specified by Architects. Adopted by the United States Government.

In use by thousands of individuals, as well as Railroads and School Boards.

Send for illustrated Booklet and Trade Discounts.

***ÆOLIPYLE CO.,* 237 Water St., NEW YORK.**

SHANLEY & BOYD, Davenport, Ia., heating and plumbing the Mennen flats.

HUFFMAN-CONKLIN CO., Columbus, O., heating Green-Joyce Co.'s new building.

J. C. BIXBY & SON, Council Bluffs, Ia., heating and plumbing large apartment house for J. C. Barnard, Omaha.

JOHN J. LUNNY, 2555 Third avenue, New York, overhauling steam heating plant in apartment house in 108th street.

THILL & LAPITZ, LaCrosse, Wis., heating and plumbing residence of F. Strop.

NOBLE, JOHNSON, MILNE & CO., Pittsfield, Mass., heating residence of Mrs. Davidson, Dalton, Mass.

F. W. BARCLAY, Beatrice, Neb., heating residence of A. L. Johnson, Lincoln, Neb.

CHAS. SMITH CO., 102 Lake street, Chicago, remodeling heating system in school, Lockport, Ill.

DESORMOUX & CO., Springfield, O., heating with steam three buildings at Greenville.

M. J. GIBBONS, Dayton, O., heating and plumbing National Bank Building.

CHAS. HOFFMAN, Mansfield, Ohio, heating and plumbing new Elks Building.

J. E. DONOHAN, 117 West Twenty-sixth street, New York, heating T. F. Corcoran residence, West 129th street.

L. G. KIRK, 419 Lexington avenue, New York, heating Auditorium for Halpern Bros., 117th street and Fourth avenue.

MANEHAN BROS., Union Hill, N. J., heating and power work for large factory building in West New York.

E. E. FORBES, 49 Hardwick street, Brighton, Mass., heating apartment building, Brookline.

SMITH & ANTHONY CO., Union street, Boston, Mass., heating $56,000 residence of Rev. J. Hutchinson, Warren, R. I.

FLORENCE HEATING CO., 112 Purchase street, Boston, Mass., heating residence of F. B. Russell, Watertown, Mass.

R. H. LEVERING, 24 Warren street, Roxbury, Mass., heating two-family house at Dorchester, for Mr. Wickmore.

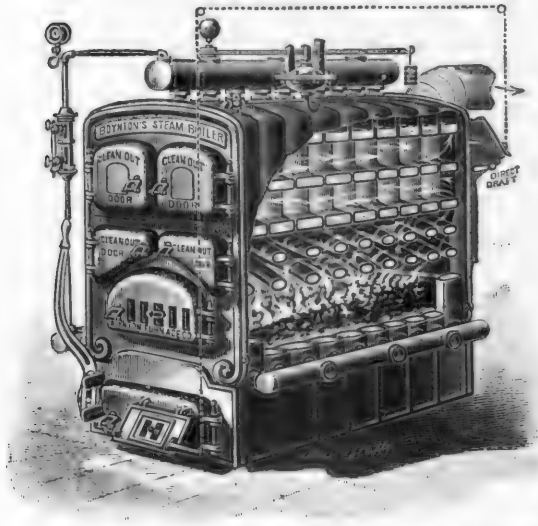
GRAY & DORMER, 1729 Columbia avenue, Philadelphia, Pa., heating and plumbing post office sub-station B.

HIMES & BARRETTA, Vineland, N. J., heating St. Paul's Lutheran Church, Millville, N. J.

S. FAITH & CO., Twenty-fourth street and Pennsylvania avenue, Philadelphia, heating cottage of the Methodist Orphanage.

KRUBEL & CO., 286 Spring Garden avenue, Philadelphia, heating building at Fifty-fourth and Chester avenue, West Philadelphia.

The Boynton Steam Boilers and Hot Water Heaters



Manufactured in 84 Sizes suitable for any requirements.

Adapted for Hard or Soft Coal, Wood or Natural Gas.

WRITE FOR CATALOGUE

The BOYNTON FURNACE COMPANY

207 and 209 Water Street NEW YORK | 10 Post Office Square BOSTON | 147 and 149 Lake Street CHICAGO

JOHN CAMPBELL, 106 Beekman street, New York, heating by hot water residence of Mr. Carter, at Oronge, N. J.

J. T. FLINN & CO., 163 Columbus avenue, New York, heating Chas. M. Schwab's residence, Seventy-third street and Riverside Drive.

WEBBER & JOHNSON, Montgomery, Ala., heating Racine Hotel.

J. C. BOSHAW CO., Pratt street, Baltimore, Md., heating Kernan's Auditorium Theater.

WICKS & CO., Pensacola, Fla., heating residence of B. T. Pitt.

HOWE & BASSETT, Rochester, N. Y., heating new County Hospital.

DEEGAN & LEARY, 306 E. Water street, Syracuse, N. Y., heating C. M. Warner's residence on West Onondaga street.

DEEGAN & LEARY, 306 E. Water street, Syracuse, N. Y., heating Arthur R. Peck's conservatories on Hames street.

F. W. WILLIAMSON, Beverly, Mass., heating Washington Hose house.

HICKEY & FARRELL, Pittsfield, Mass., heating new Orchard street school building.

BUCKEYE HEATING & SUPPLY CO., 3 Court Place, Cleveland, O., heating residence of John L. Scott, Grace avenue.

WILSON & WANLESS, Bay City, Mich., heating Wenona school.

ENGLISH & DOLLIVER, Lewiston, Me., heating and plumbing Beta Theta Pi Chapter house, Orono, Me.

D. H. KELLEY, Derby, Conn., heating five residences, using Cottage and Mercer boilers.

EMPIRE HEATING CO., Tatamy, Pa., heating four churches.

MONITOR STEAM GENERATOR MFG. CO., Seventh and Arch streets, Philadelphia, heating buildings at Frankford for Chas. Nelson's Sons.

THOMPSON BROS., 112 Broad street, Philadelphia, heating United Republican Club building.

CHAS. ACKERMAN, 250 Brook avenue, Bronx Borough, New York, heating and plumbing residence of Louis Lawton, Tuckahoe, N. Y.

BARLOW BROS., Waterbury, Conn., heating residence of A. I. Chatfield.

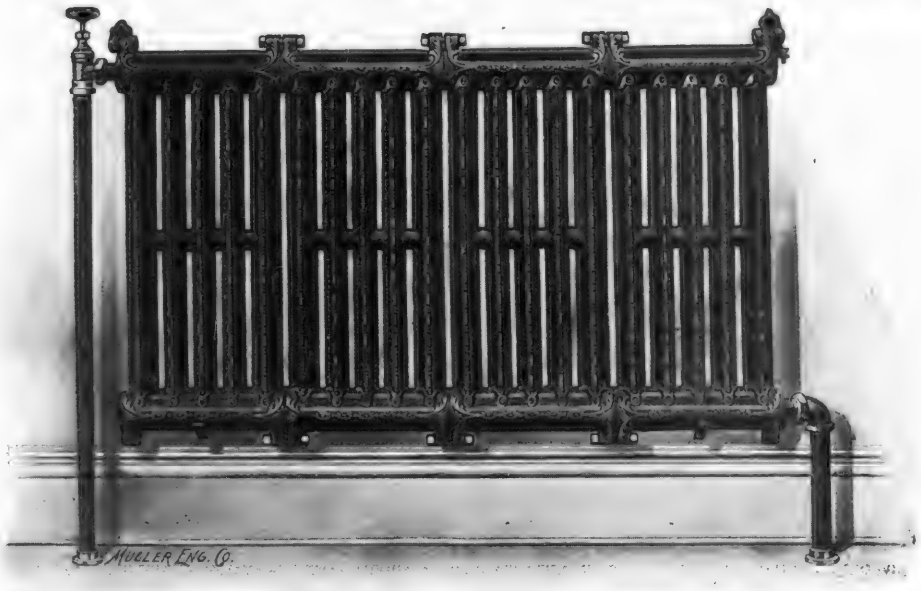
RUHAAK & LACKMAN, Pekin, Ill., heating St. George's Church.

YORK ENGINEERING CO., York, Pa., heating Baldwin office building, Baltimore.

OKLAHOMA IRON WORKS CO., remodeling heating plant, Capital Hill school, Guthrie, Okla.

"Novus" Wall Radiator

PATENTED



Slip Nipple Connections Consequent freedom from leaks when many sections are combined in one radiator. Easily assembled without special tools. **Artistic in Appearance**

National Radiator Company, Johnstown, Penn.

PHILIP & WILLIAM HAAS, Dayton, O., heating Wagner Hotel at Greenville, Ohio.

ALLEN, MYERS & CO., Rock Island, Ill., heating by hot water, Paridon & Son's building, Seventeenth street.

ALTON PLUMBING & HEATING CO., Alton, Ill., heating Masonic Temple by connection with the public heating plant.

A. H. BROWN, 418 Pearl street, Sioux City, Ia., heating and plumbing J. W. Brown's residence, Ninth and Jennings streets.

F. W. ARNDT, Blair, Neb., heating four-story annex of the Danish Club, a two-story building of the Danish Lutheran Publishing House and the Blair State Bank office building.

SAXTON HEATING CO., Minneapolis, Minn., heating addition to hospital at Fort Snelling.

CAMPBELL-LAIRD HEATING CO., Minneapolis, Minn., heating residence of Mrs. Jennie Eckert, 309 University avenue.

W. F. PORTER CO., Minneapolis, Minn., heating and plumbing gymnasium building at Fort Kenyon, Sheridan, Wyo.

BUCKEYE HEATING & SUPPLY CO., 3 Court Place, Cleveland, O., heating apartment house on Kinsman street.

GRAY & DORMER, 1729 Columbia avenue, Philadelphia, heating store and apartment house, 1723 Columbia avenue.

H. C. WORRELL, Riverton, N. J., heating residence of William J. Thomason.

JAMES H. JOHNSON, Washington, N. J., heating and plumbing residence of William Willever, on Youman avenue.

P. H. SWEENEY, Salem, Mass., heating Salem custom house, using two large Richmond boilers, made by the Kellogg-McCrum-Howell Co., New York.

CROOKSTON PLUMBING CO., Crookston, Minn., heating by steam, the Rauch block.

LOOS & DIETERLE, Sterling, Ill., installing in Odd Fellows' building a heating system to be supplied with steam from another plant.

SIOUX CITY PLUMBING CO., Sioux City, Ia., heating and plumbing the Hunt school house.

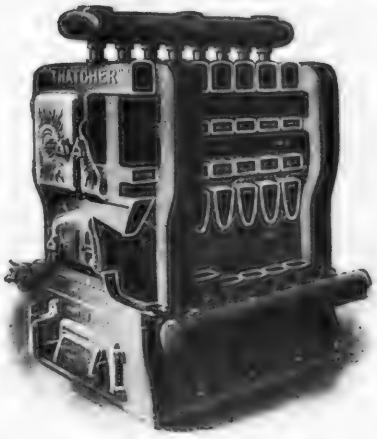
C. J. LEARY, Monson, Mass., heating Monson free library and reading room, using Hub boiler made by Smith & Anthony Co., Boston.

WEBBER & JOHNSON, Montgomery, Ala., heating Racine Hotel.

WICKE & CO., Pensacola, Fla., heating residence of B. R. Kitt.

LOOS & DIETERLE, Sterling, Ill., heating European Hotel.

ASK THE OWNER



Ask the owner of a well heated house the name of his heater, and nine cases out of ten that name will be **"Thatcher."**

And that's your cue, or one way for you to increase your business.

Satisfy your customers by selling them **Thatcher Heaters,** and the chances are that the recommendations they are bound to give will benefit you more than the extensive advertising were the heater other than **Thatcher.**

Thatcher Furnace Company

240 Water Street, New York City.

Works: NEWARK, N. J.

CHAS. A. RILEY, Broad and Cumberland streets, Philadelphia, heating building for A. Vogt, York and Bancroft streets.

S. B. ARDERY & SONS, Bristol, Conn., heating building at 8111 Frankford avenue, Philadelphia.

CHAS. H. HARRIS & CO., INC., 17th and Chestnut streets, Philadelphia, heating building for H. D. Hoffer, 531 Market street.

KRIEBEL & CO., 826 Spring Garden avenue, Philadelphia, Pa., heating residence of N. L. Kenton, 226 South 39th street.

BARLOW BROS. CO., Waterbury, Conn., heating Holmes building, Girard street.

JOHN BORDEN & BRO., Fairmont avenue and 17th street, Philadelphia, Pa., heating residence of L. Dickey on South 43d street.

A. C. EDGAR, 18 S. Seventh street, Philadelphia, heating confectionery store of Stephen F. Whitman & Son.

HARRY SMITH, Warren, O., heating and plumbing Masonic Temple.

BUCKEYE HEATING & SUPPLY CO., 3 Court Place, Cleveland, O., heating residence of Chas. W. Lapp on Burden street.

P. GORMLY, 124 North 10th street, Philadelphia, heating Industrial Trust Company's building, Front street.

SCHNEIDER PLUMBING CO., 570 Euclid avenue, Cleveland, O., heating apartment house on East Prospect street.

CLEVELAND STEAMFITTING & SUPPLY CO., 1084 Hamilton street, Cleveland, O., heating residence of Otis Southworth.

P. J. TURNBULL, 389 Pearl street, Cleveland, O., heating apartment house on Detroit street for M. F. Bramley.

BUCKEYE HEATING & SUPPLY CO., 3 Court Place, Cleveland, O., heating residence of A. W. Frank, Westchester and Hampden avenues.

P. K. CRAWFORD HEATING AND MANUFACTURING CO., 1 Cooper street, Cleveland, O., heating residence of Loftus Cuddy, Euclid avenue.

DOONER & SEAGER, Niagara Falls, N. Y., heating office building on Falls street, for Wood Harman & Co.

TRIMBLE & LUTZ, Wheeling, W. Va., heating St. Clairsville court house, using Webster system.

E. F. ROBERTS, Columbus avenue and 23d street, Philadelphia, heating German Sunday School, Orianna street and Susquehanna avenue.

The New York Radiator

The Latest and Most Improved Construction

New York Three Column.

FULL EFFICIENT SURFACE

ARTISTIC DESIGN

ALL HEIGHTS

New York Radiator Company

79 Lake Street
CHICAGO

78 Lafayette Street
UTICA, N. Y.

233 Water Street
NEW YORK

H. C. NORRELL, Riverton, N. J., heating residence of J. W. Vodges, Edgewater Park, N. J.

FULLER & WARREN CO., St. James Building, New York, heating and ventilating Third Ward school, Irvington, N. Y.

JOHN G. SUTTON & CO., San Francisco, heating Bank of California.

JOHN G. SUTTON & CO., heating Carnegie Library, Berkeley, Cal.

JOHN G. SUTTON & CO., heating government hospital, Fort McDowell, Cal.

DANIEL SPRINGER, Tamaqua, Pa., heating three school buildings.

L. H. KURTZ, Ames, Ia., heating and plumbing State College.

SHERMAN PLUMBING CO., Sherman, Texas, remodeling heating and ventilating plant in court house.

C. M. HERSEY, Pittsfield, Me., heating Pittsfield National Bank, using Winchester heater.

JAMES E. EITAPENCE, Rutland, Vt., heating and plumbing new Union Station.

S. H. MORGAN, Detroit, heating residence for Jennie Bates, 759 Second avenue.

JAMES P. WOOD HEATING CO., 59 South Fourth street, Philadelphia, heating the Agnew Ward, University Hospital.

JOHN G. GENT, 1011 Tremont avenue, New York, heating hotel, 129th street and Third avenue.

GILLIS & GEOGHEGAN, 537 W. Broadway, New York, heating apparatus for St. Patrick's Cathedral.

E. W. WEBSTER, DuBois, Pa., heating and plumbing the Demiling Hotel, Clearfield, Pa.

ELMER E. WAKEFIELD, Elizabethtown, N. Y., heating residence of Mrs. Marks, using Ideal boiler and American radiators.

SMITH & HAWKS, Lee, Mass., heating new post office building.

G. H. BROWN & CO., Seattle, Wash., heating new Palmer building.

D. F. HOOD, Westfield, Mass., heating and plumbing new high school, Turner's Falls.

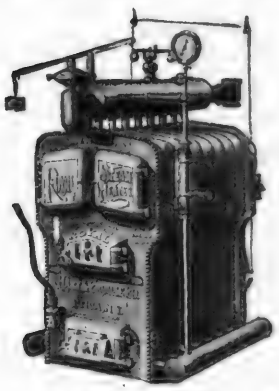
T. K. JONES & BRO., Dover, Del., heating Dover Opera House.

J. J. KAVENNY, 28 Valley Road, Montclair, N. J., heating and plumbing several large residences in Marlboro Park.

H. C. WORRELL, 605 Main street, Riverton, N. J., heating several residences.

FRANK MERRELL & CO., 19 Pearl street, Boston, Mass., heating Danbury Normal School. Powers regulator will be used.

ROYAL HEATERS



LARGEST AND MOST SUCCESSFUL LINE OF HEATING APPARATUS IN AMERICA

Hot Water and Steam Heaters, Combination Heaters, Hot Air Furnaces

HART & CROUSE COMPANY

78 La Fayette Street, UTICA, N. Y.

COLUMBUS, OHIO CHICAGO, ILL., 79 Lake St. NEW YORK, 235 Water St.

BRITISH STEAM SPECIALTIES, Ltd., Fleet Street, Leicester, England.
MAGUIRE & GATCHELL, Ltd., Dublin, Ireland.

L. F. BANNON, Kingston, N. Y., heating new administration building.

THILL & LAPITZ, La Crosse, Wis., heating and plumbing residence of F. Strip.

MORIARTY & RAFFERTY, New Haven, Conn., heating residence of Chas. Jordan, using Richmond boiler.

PERRY & SONS, Belvidere, N. J., heating court house at Warren, N. J.

SPENCER HEATER CO., Scranton, Pa., heating Methodist church, Jermyn, Pa.

DAVID CLARK, Cohoes, N. Y., heating Cohoes Savings Institution.

LIBBY & BLINN, Hartford, Conn., heating Phoenix Insurance Building.

CHARLES THATCHER CO., Waterbury, Conn., heating addition to the Nurses' Home, Waterbury hospital.

W. A. HOWARD, Oconto, Ia., heating engine house, De Pere, Ia.

L. E. ANDREWS & CO., Worcester, Mass., heating and ventilating the Lane School.

J. REILLY, JR., Bridgeport, Conn., heating addition to factory of American Graphophone Co.

J. W. CUFF & CO., Philadelphia, Pa., heating School of Design for Women, using the Broomell vapor system.

J. C. BIXBY & SONS, Council Bluffs, Ia., heating court house at Fremont, Neb.

HENDERSON PLUMBING CO., Henderson, Ky., heating residence of William Elliott.

PARKER & O'CONNOR, New Britain, Conn., heating new building at town farm.

DAN. SEXTON, Macoupin, Ill., heating South school building.

RIVERTON SUPPLY CO., Riverton, N. J., installing vapor heating system in residence of Mrs. Henry E. Parish.

Hot Water Circulation

ILLUSTRATED

Fifty blue prints bound, showing range boiler connections and hot water circulation under all possible conditions; full notes and practical suggestions; the result of 35 year's experience. - - - - - - **Price, $3.00**

MODERN PLUMBING STEAM AND HOT-WATER HEATING

By JAMES J. LAWLER

Over three hundred diagrams and illustrations showing the various systems of heating and ventilating by steam or hot water.

Six Folding Inserts showing Waste-pipe System of Plumbing, One-pipe Systems of Steam and Hot-water Heating, Overhead System, Fan System of Heating and Ventilation, and Steam and Hot-water Circuits. 400 Pages, Large Octavo Size, 10 x 7½ inches, Bound in Extra Cloth. Price, $5.00, prepaid in the United States. Postage added for Foreign Countries.

HEATING & VENTILATING MAGAZINE, 1123 Broadway, NEW YORK

HUFFMAN-CONKLIN CO., Columbus, O., steam piping for Cincinnati infirmary at Hartwell, O.

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